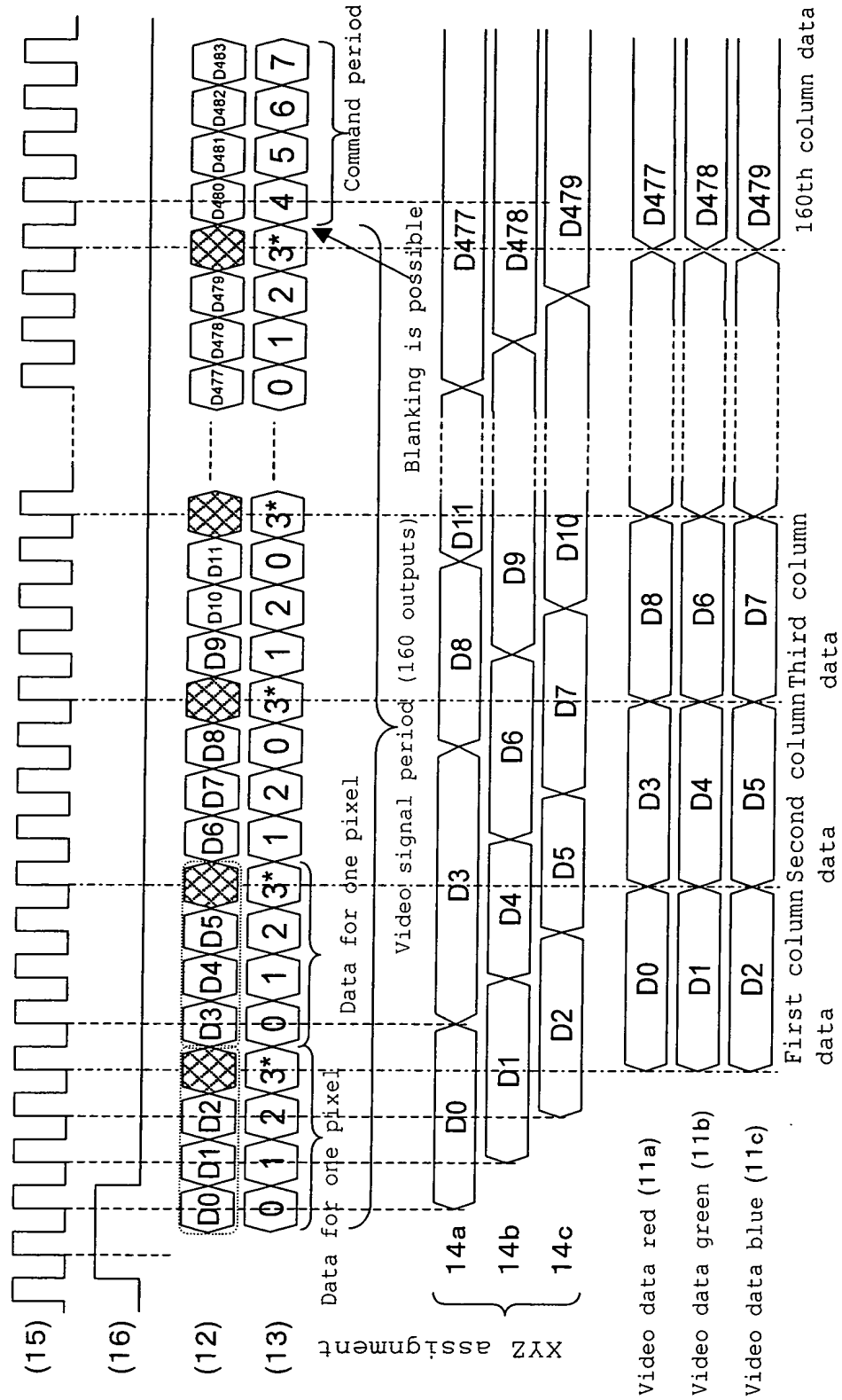


Fig. 1



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Fig. 2

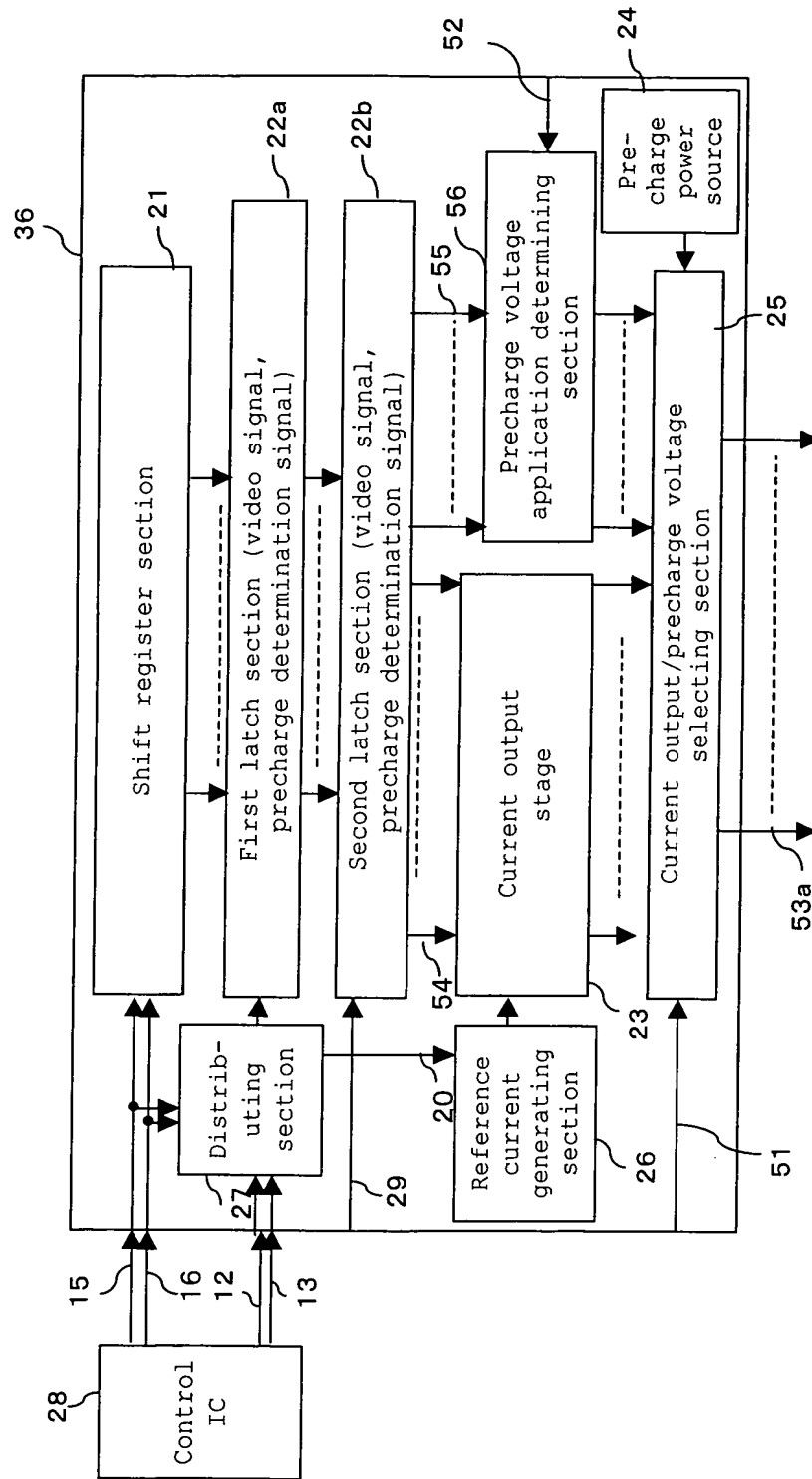
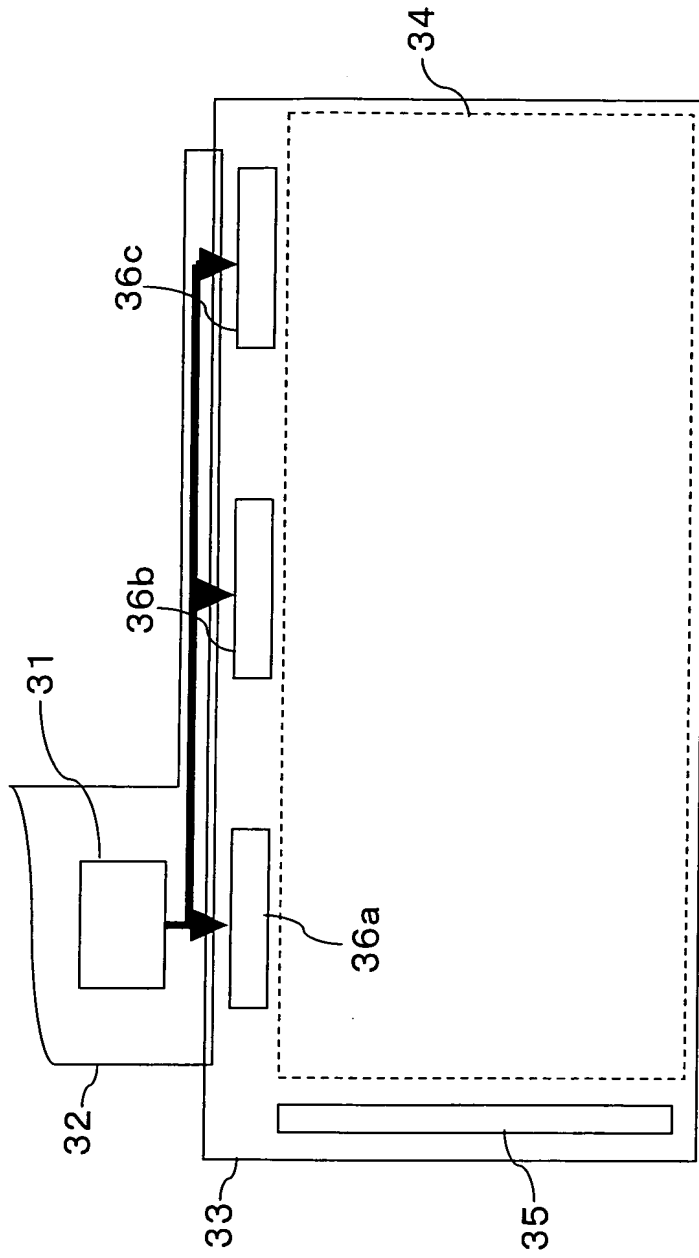


Fig. 3



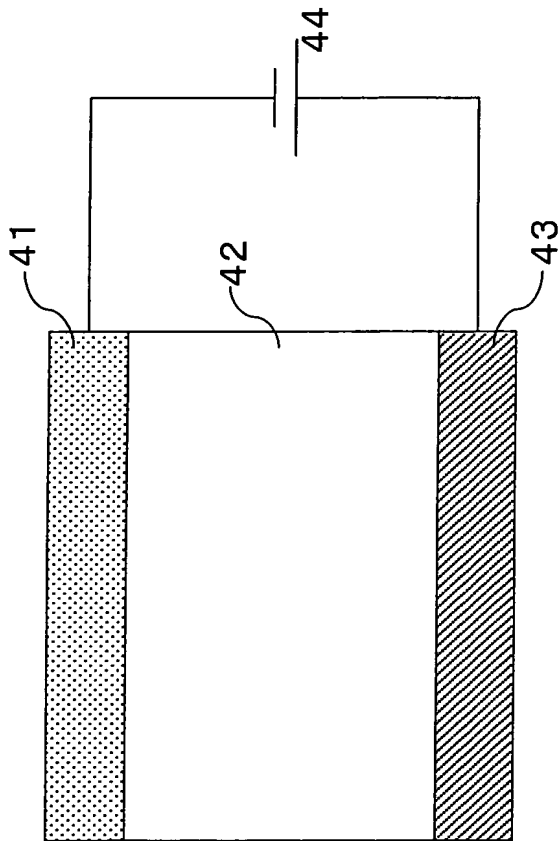


Fig. 4

Fig. 5(b)

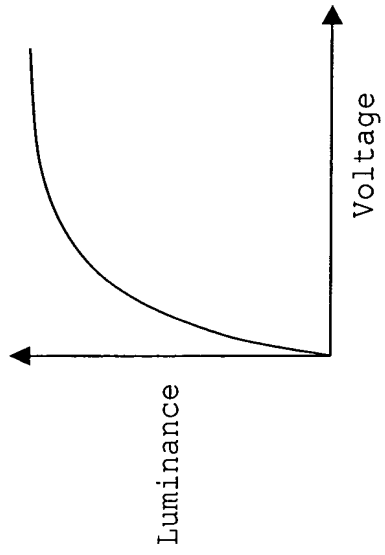
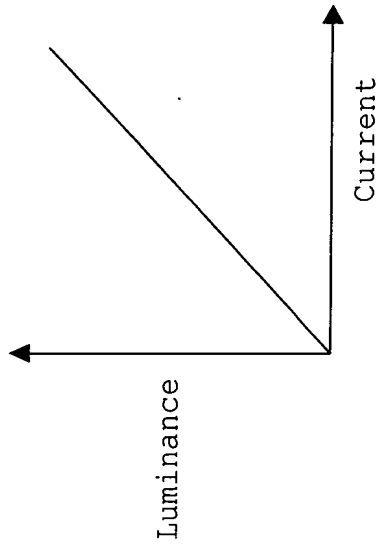


Fig. 5(a)



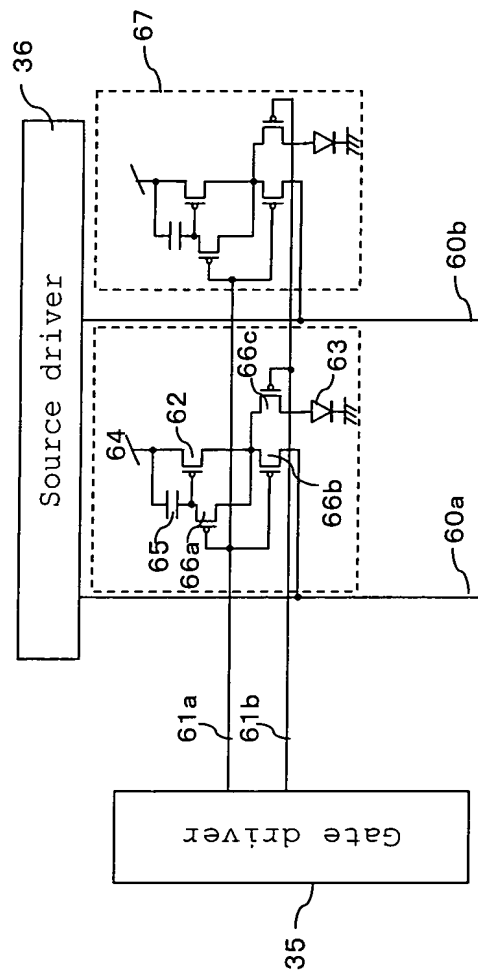


Fig. 6

Fig. 7(a)

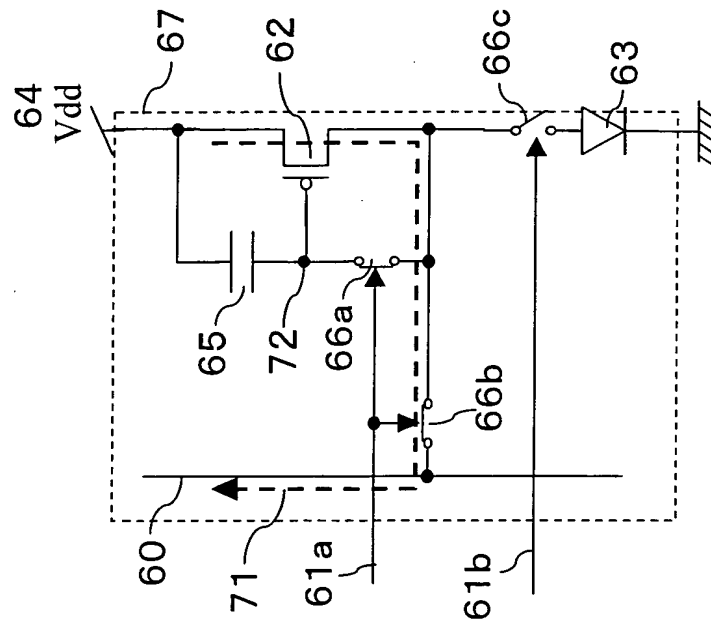
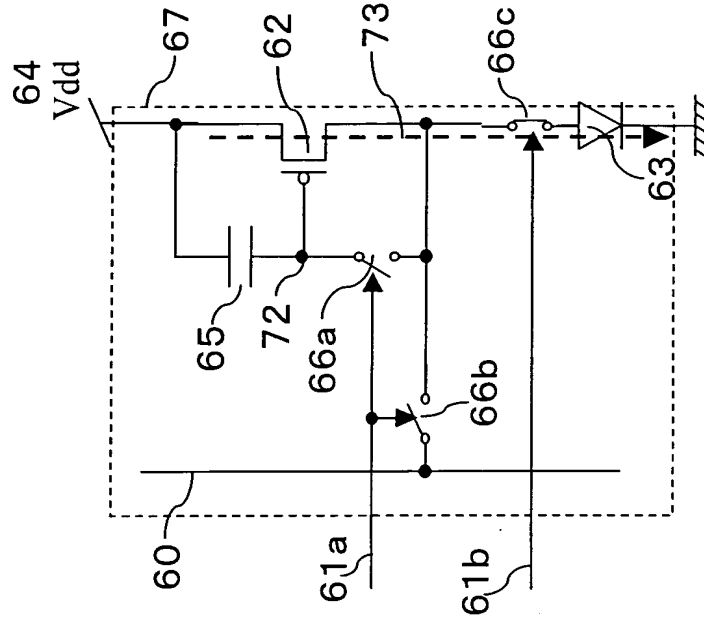


Fig. 7(b)



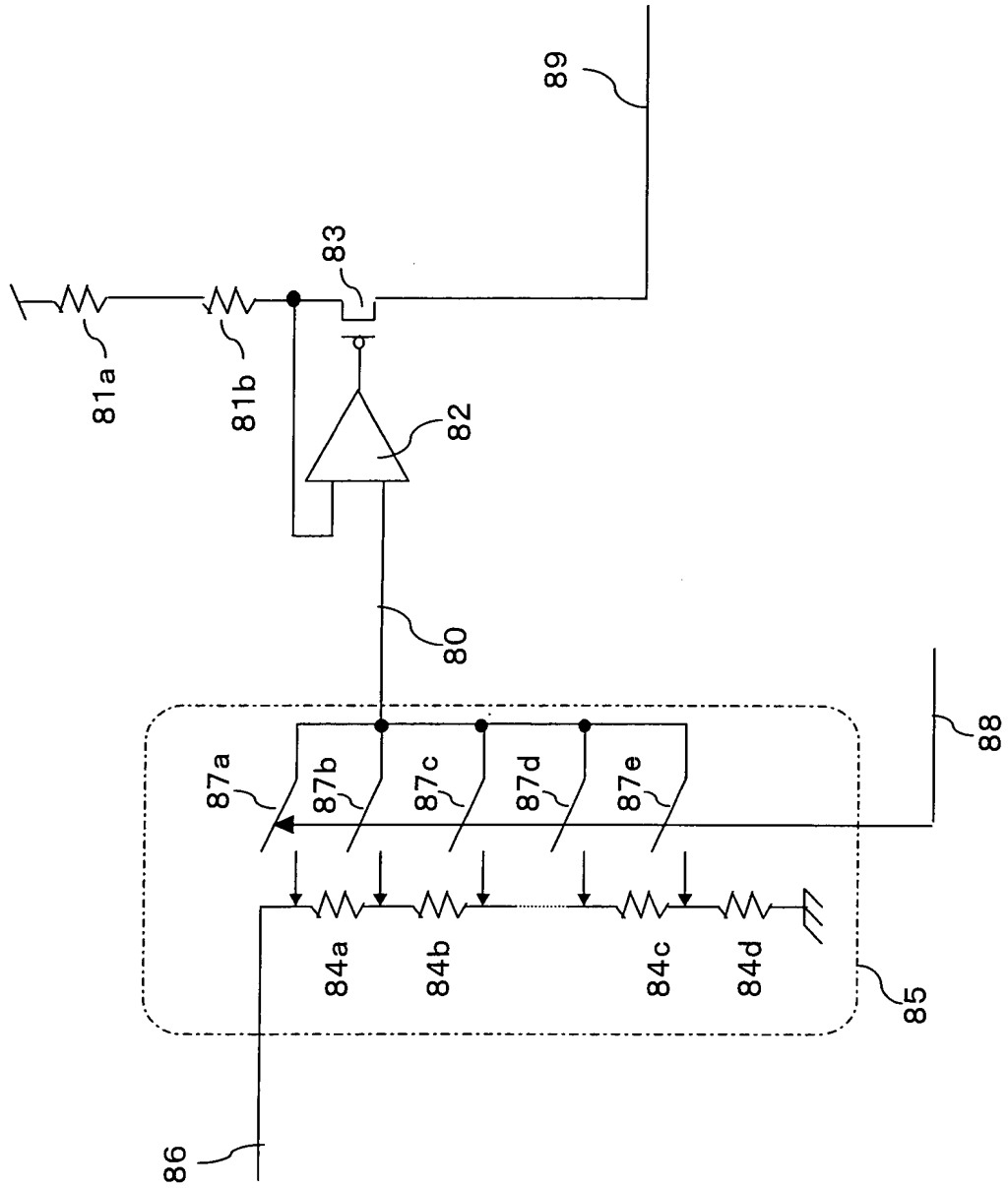
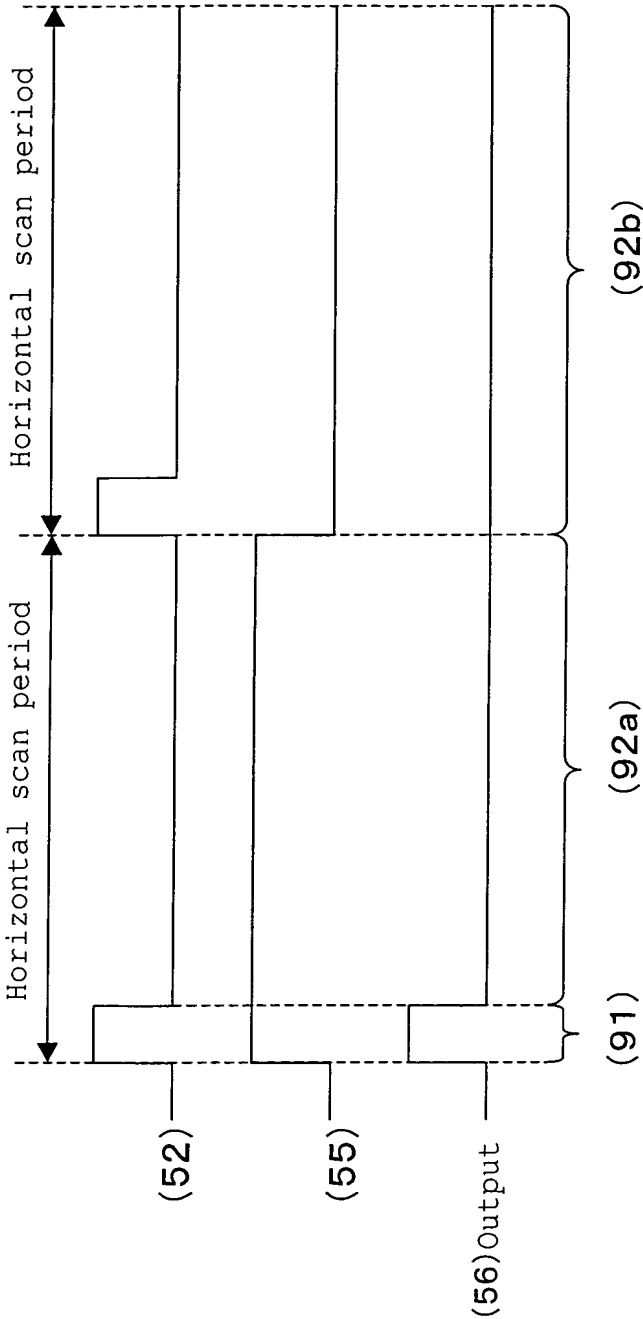


Fig. 8

Fig. 9



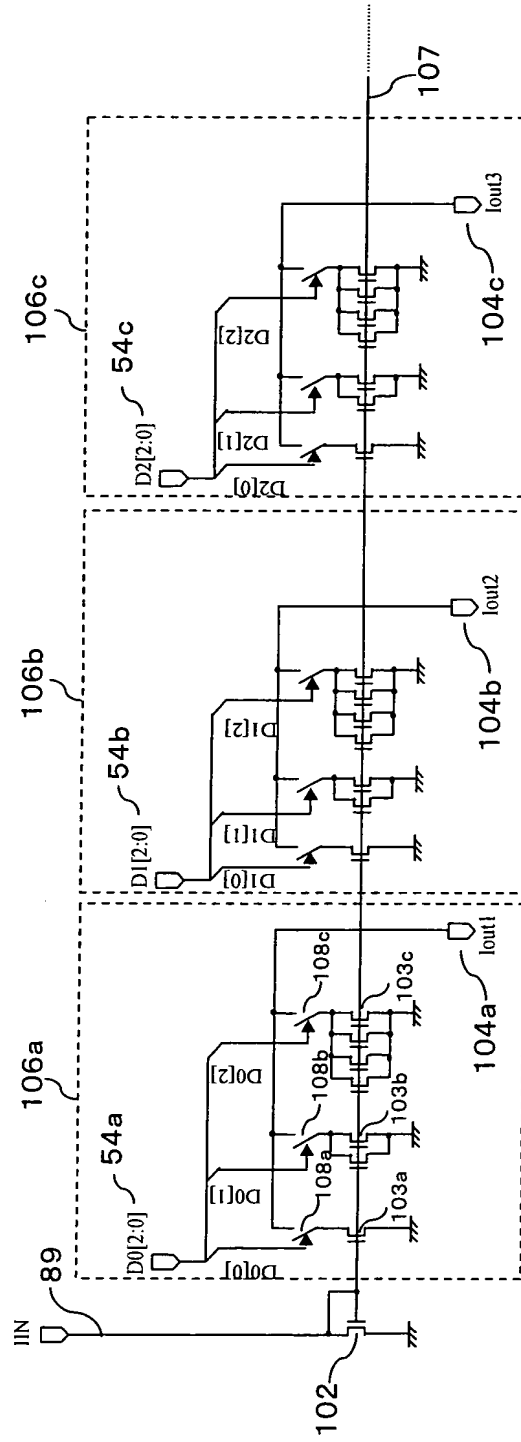


Fig. 10

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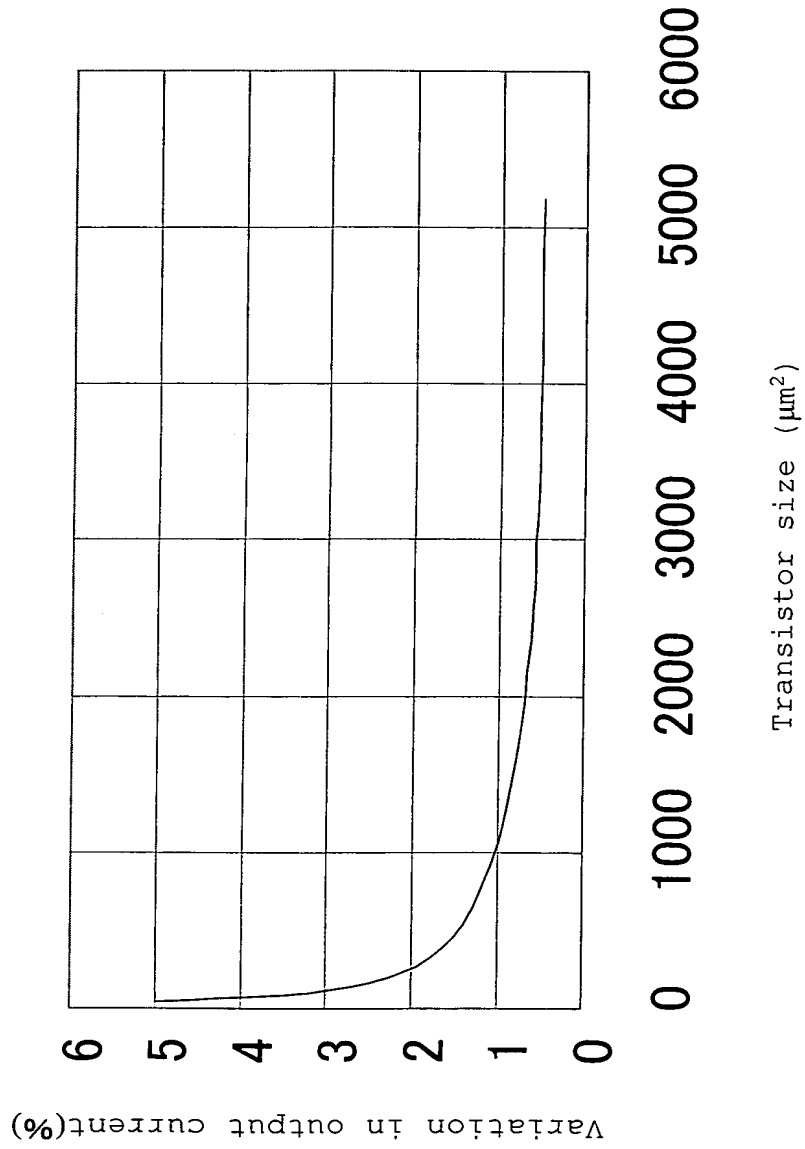


Fig. 11

Fig. 12 (a)

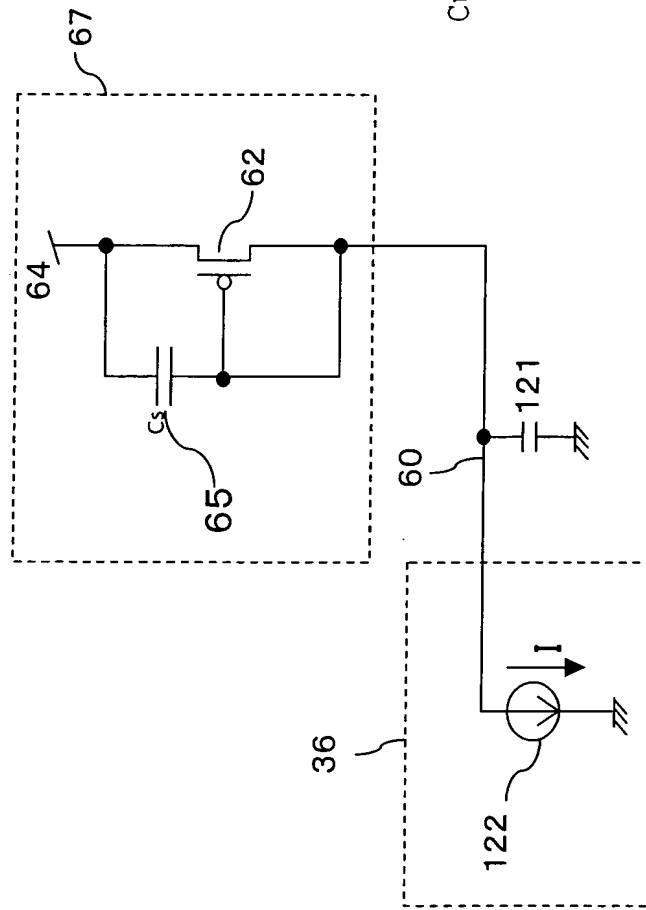
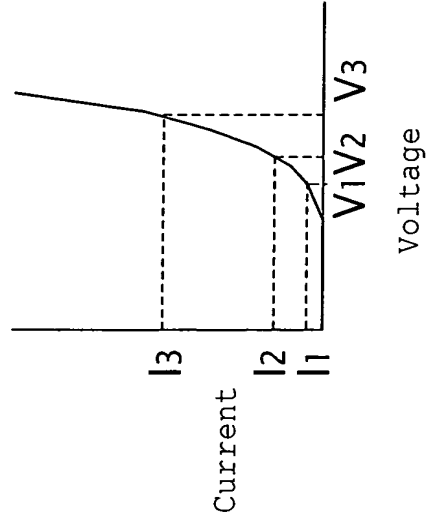
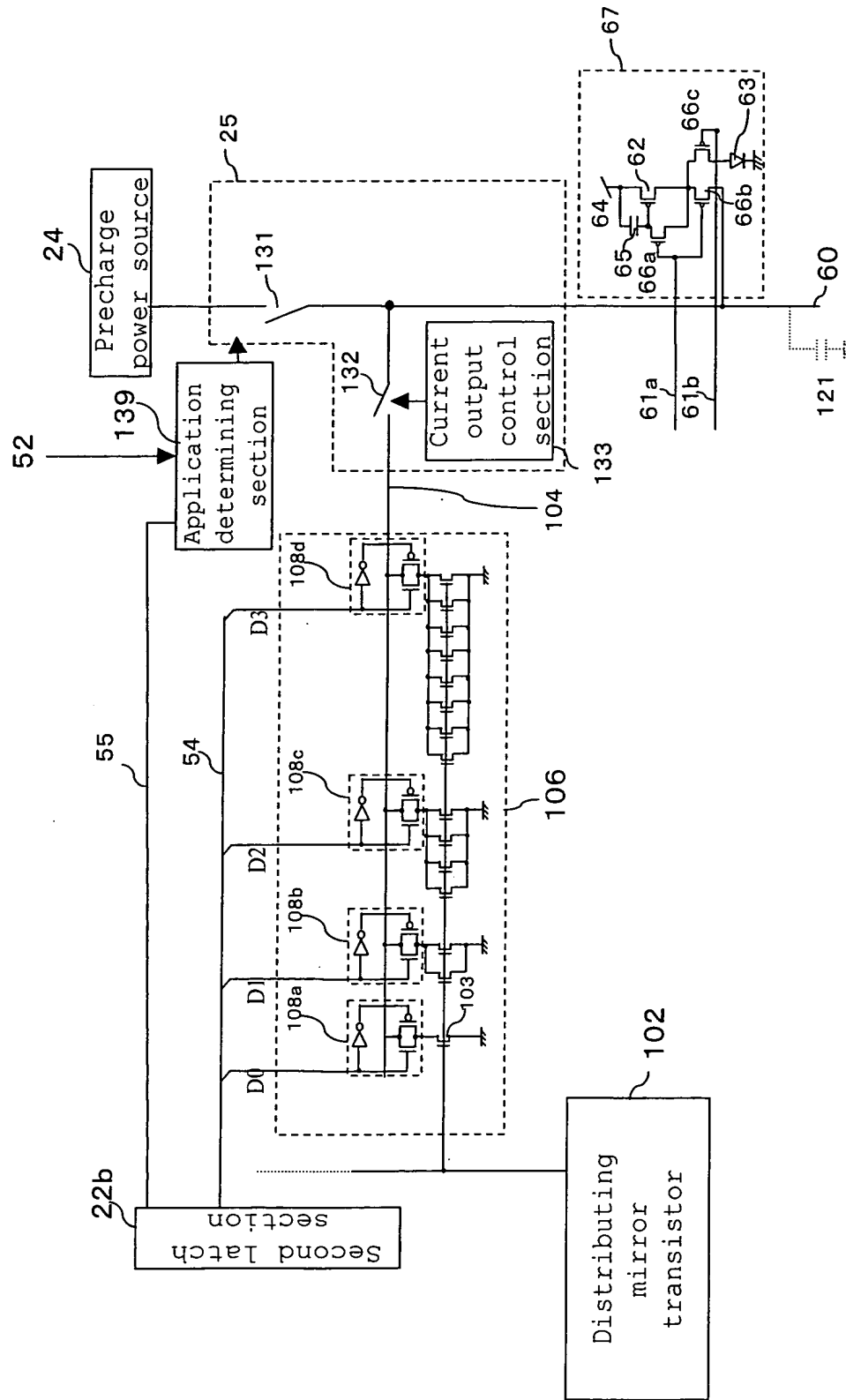


Fig. 12 (b)



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Fig. 13



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Fig. 14(a)

Gray level	Transistor group	Characteristics of transistor group		
		Channel width [μm]	Channel length [μm]	Variation in output current [%]
1	241a	3.0	54	2.5
2	241b			1.8
4	242a	6.0	27	2.5
8	242b			1.8
16	242c			1.3
32	242d			0.9
64	242e			0.6
128	242f			0.5

Fig. 14(b)

Gray level	Transistor group	Characteristics of transistor group		
		Channel width [μm]	Channel length [μm]	Variation in output current [%]
1	241a	1.5	27	5.0
2	241b			3.5
4	242a	6.0	27	2.5
8	242b			1.8
16	242c			1.3
32	242d			0.9
64	242e			0.6
128	242f			0.5

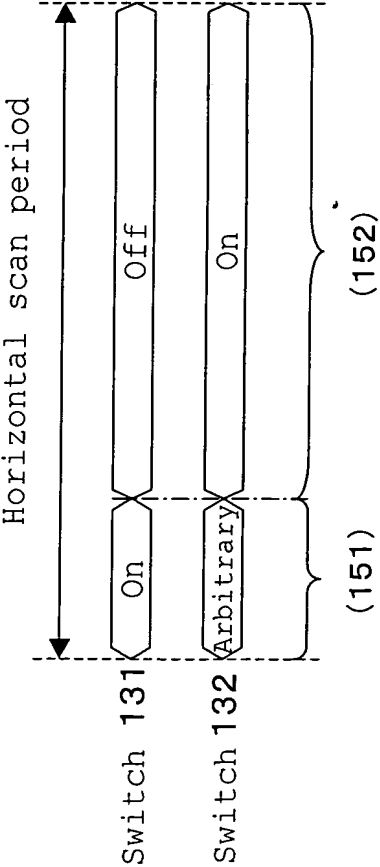


Fig. 15

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Fig. 16

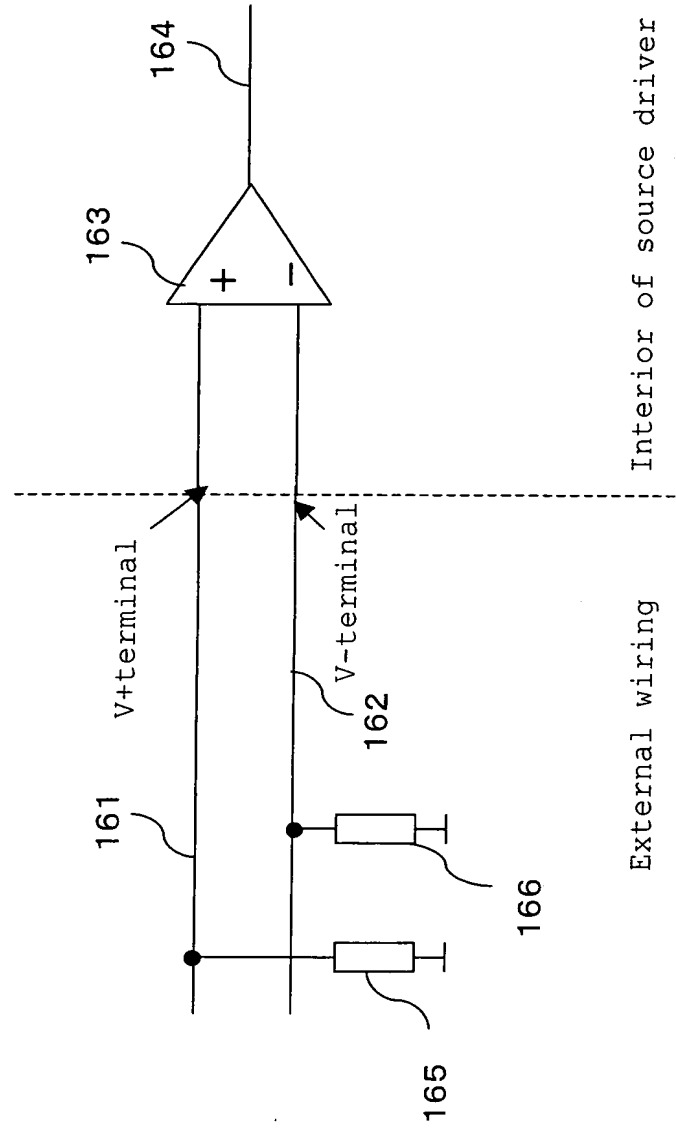


Fig. 17 (a)

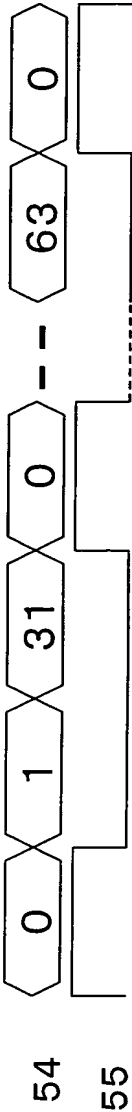


Fig. 17 (b)

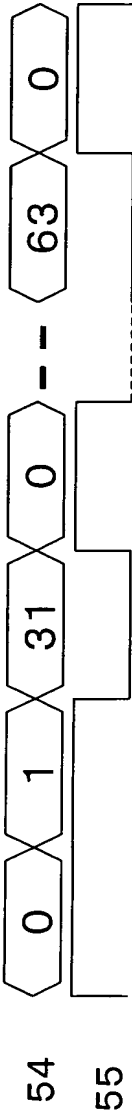


Fig. 17 (c)

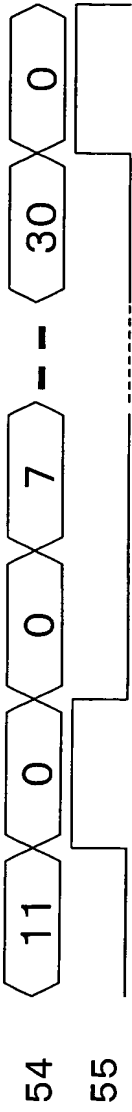


Fig. 18

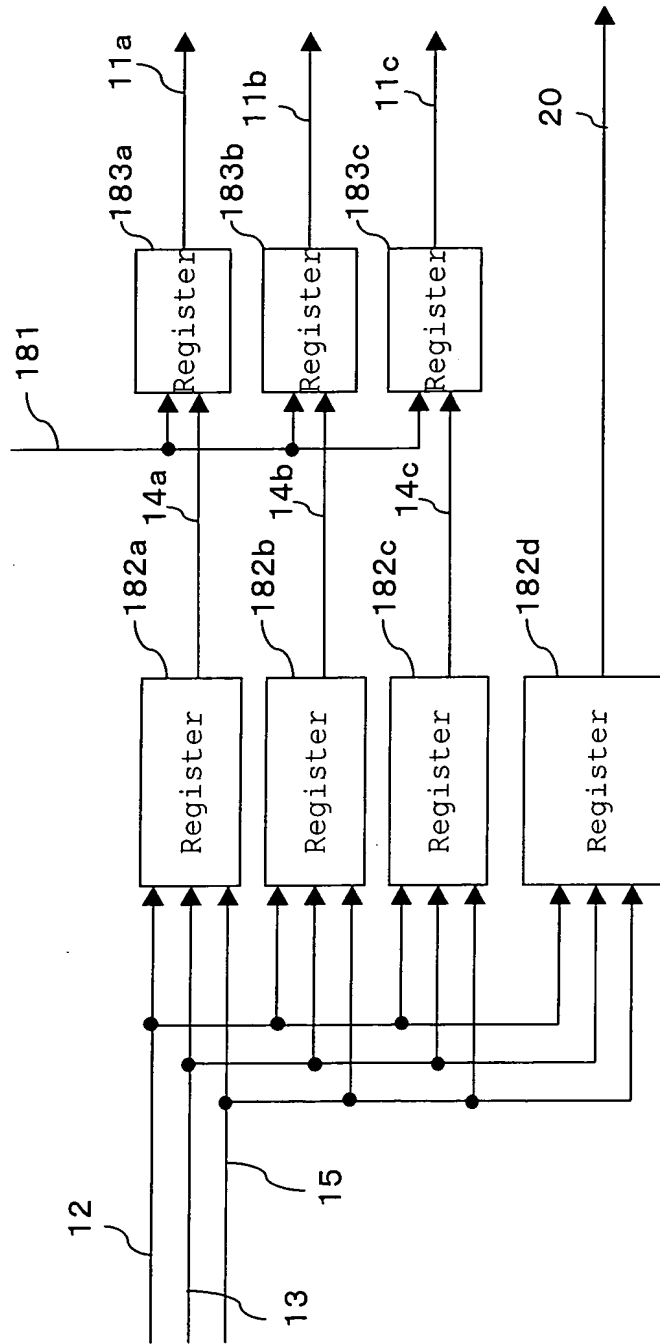
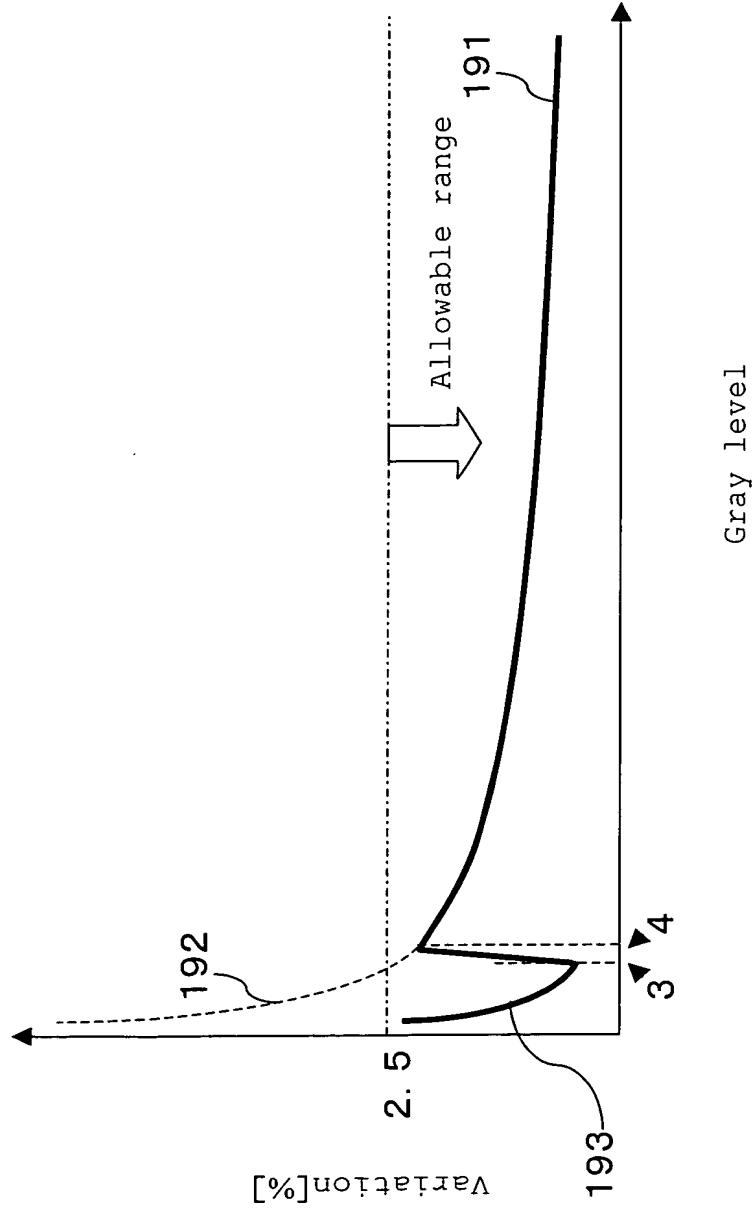


Fig. 19



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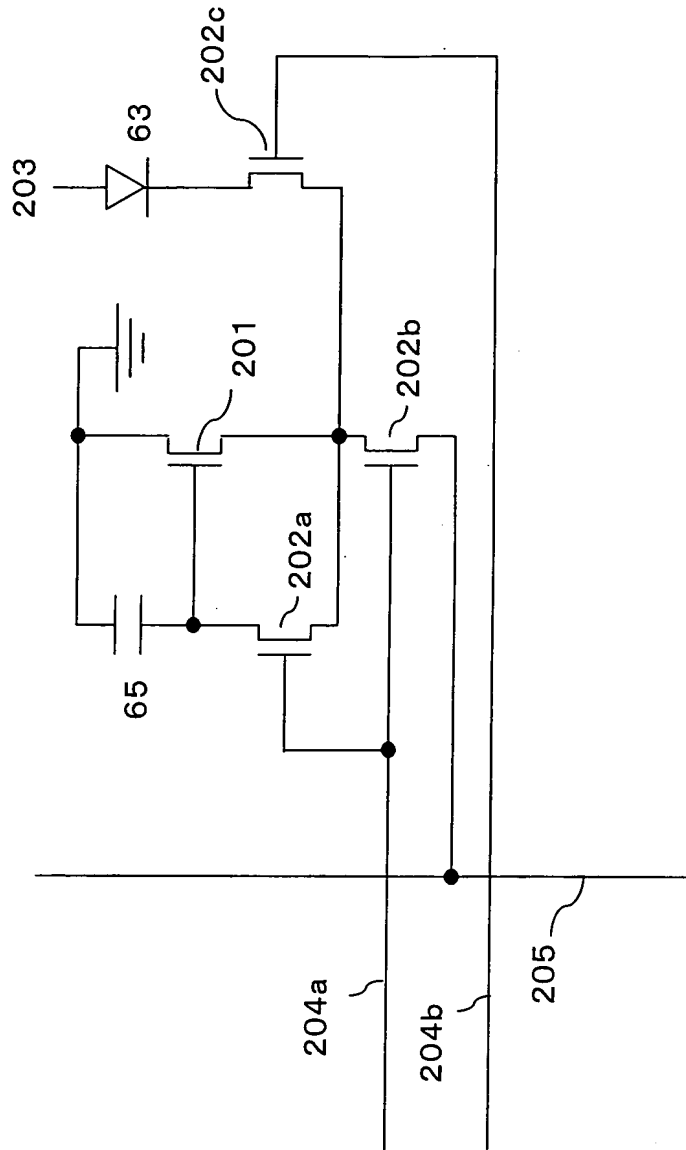
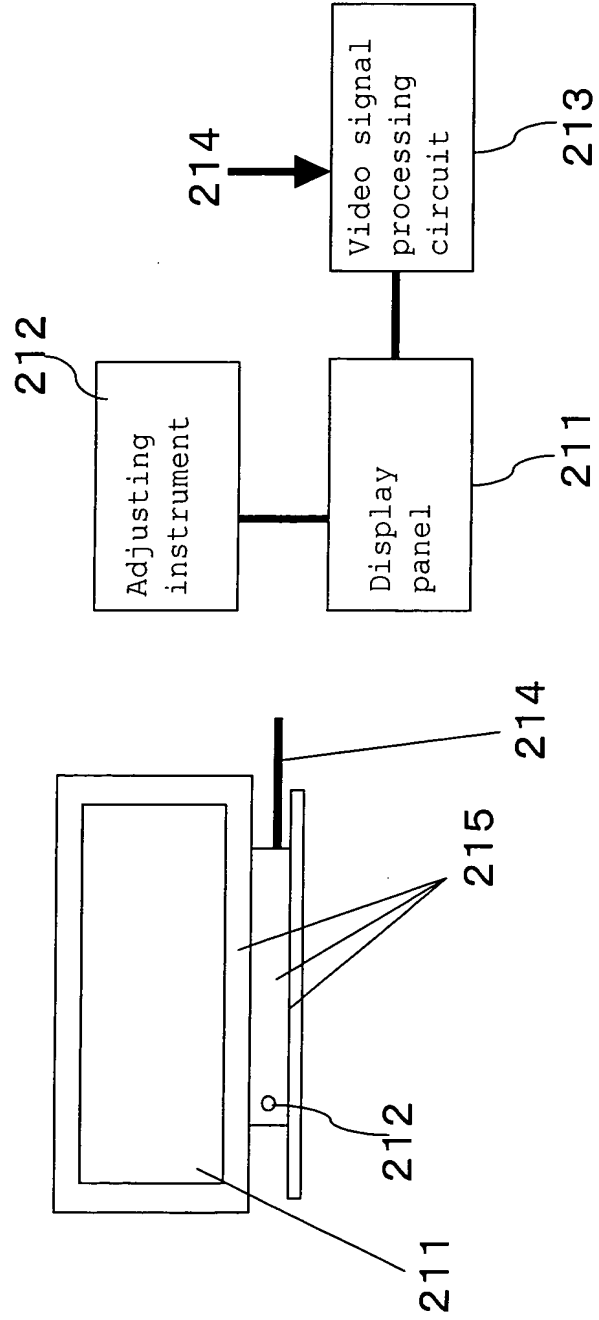


Fig. 20

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Fig. 21



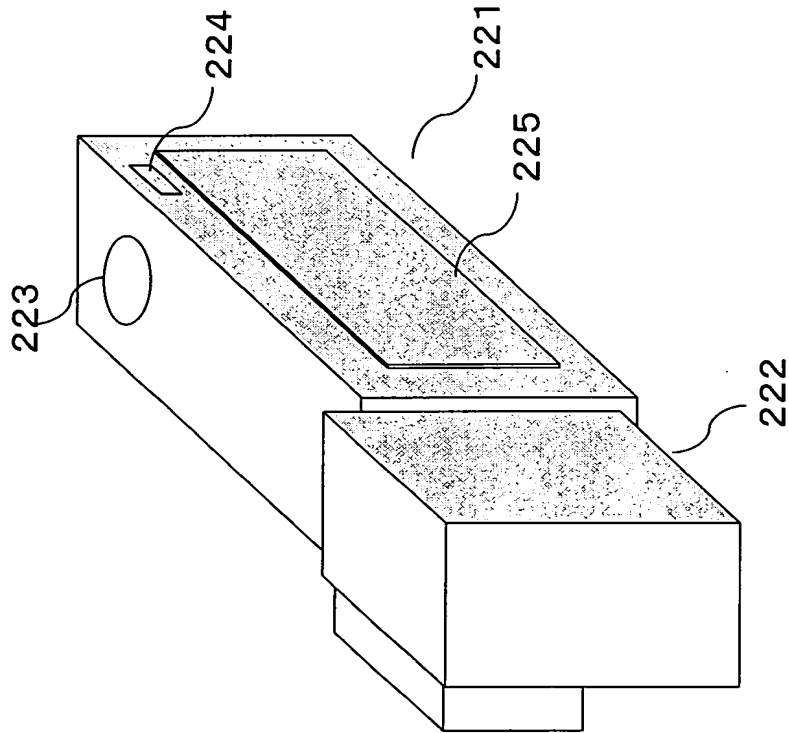


Fig. 22

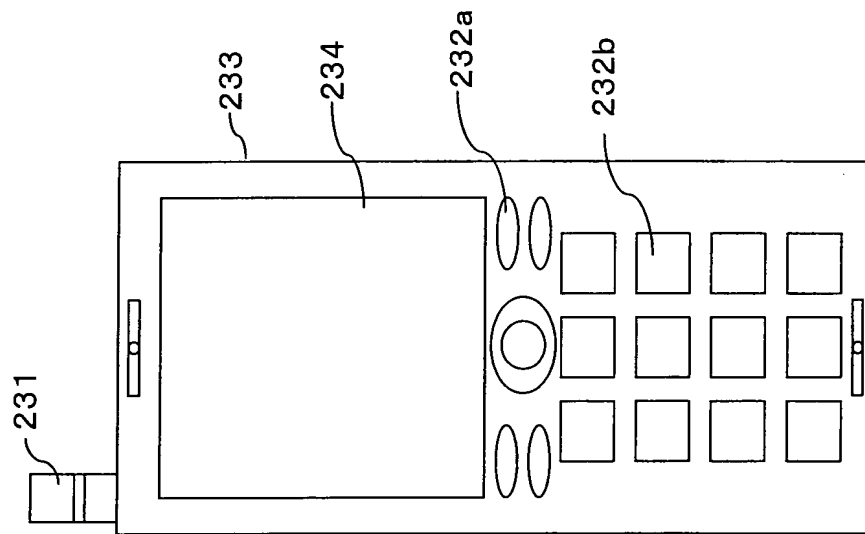
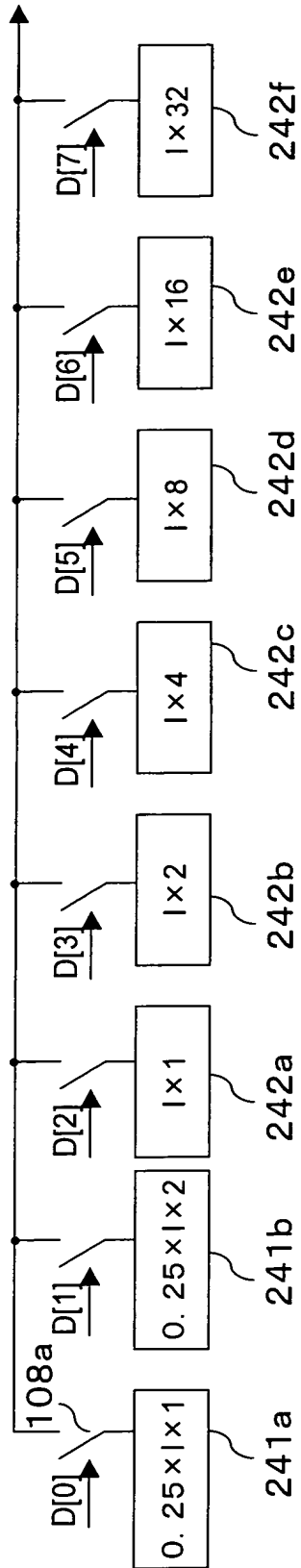


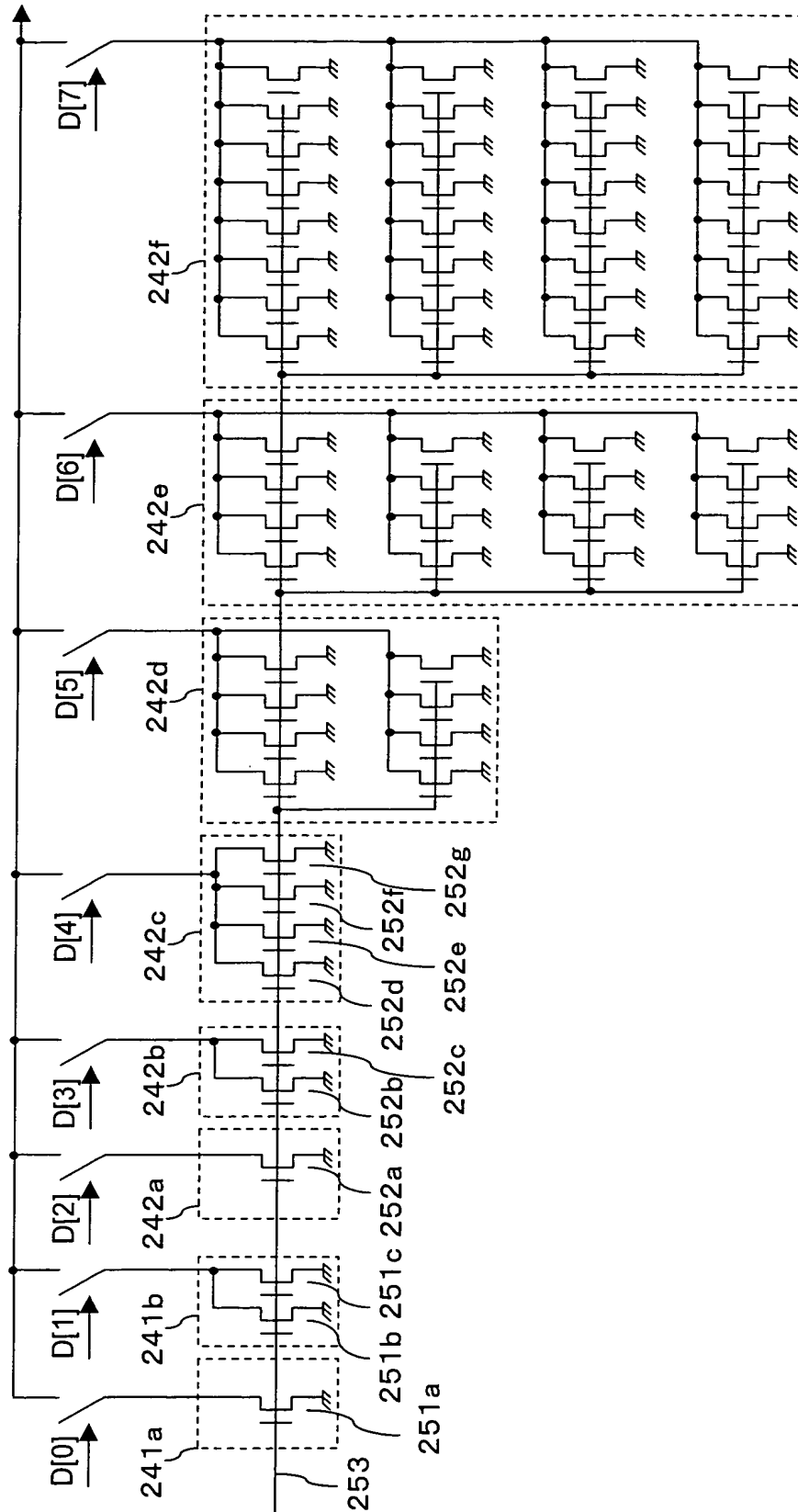
Fig. 23

Fig. 24

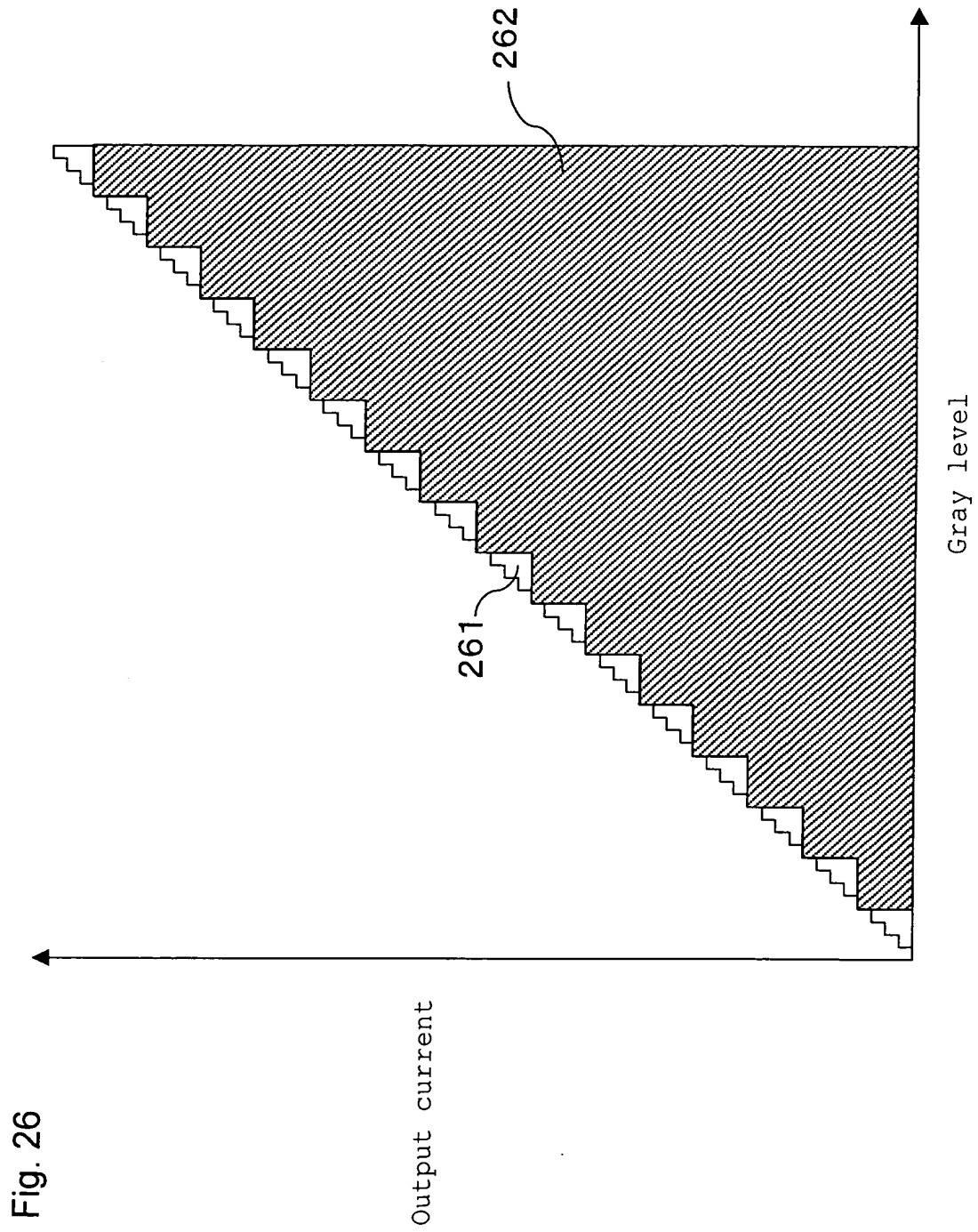


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Fig. 25



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Fig. 27

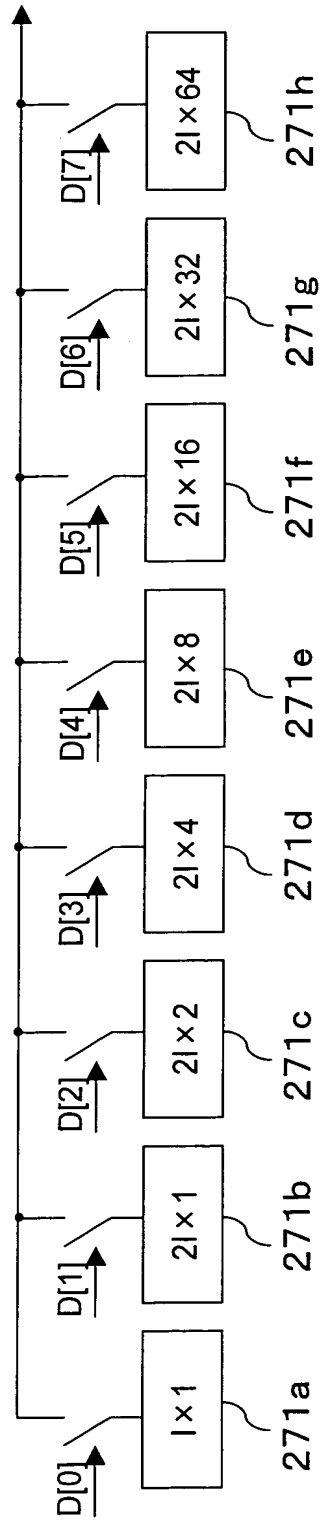


Fig. 28

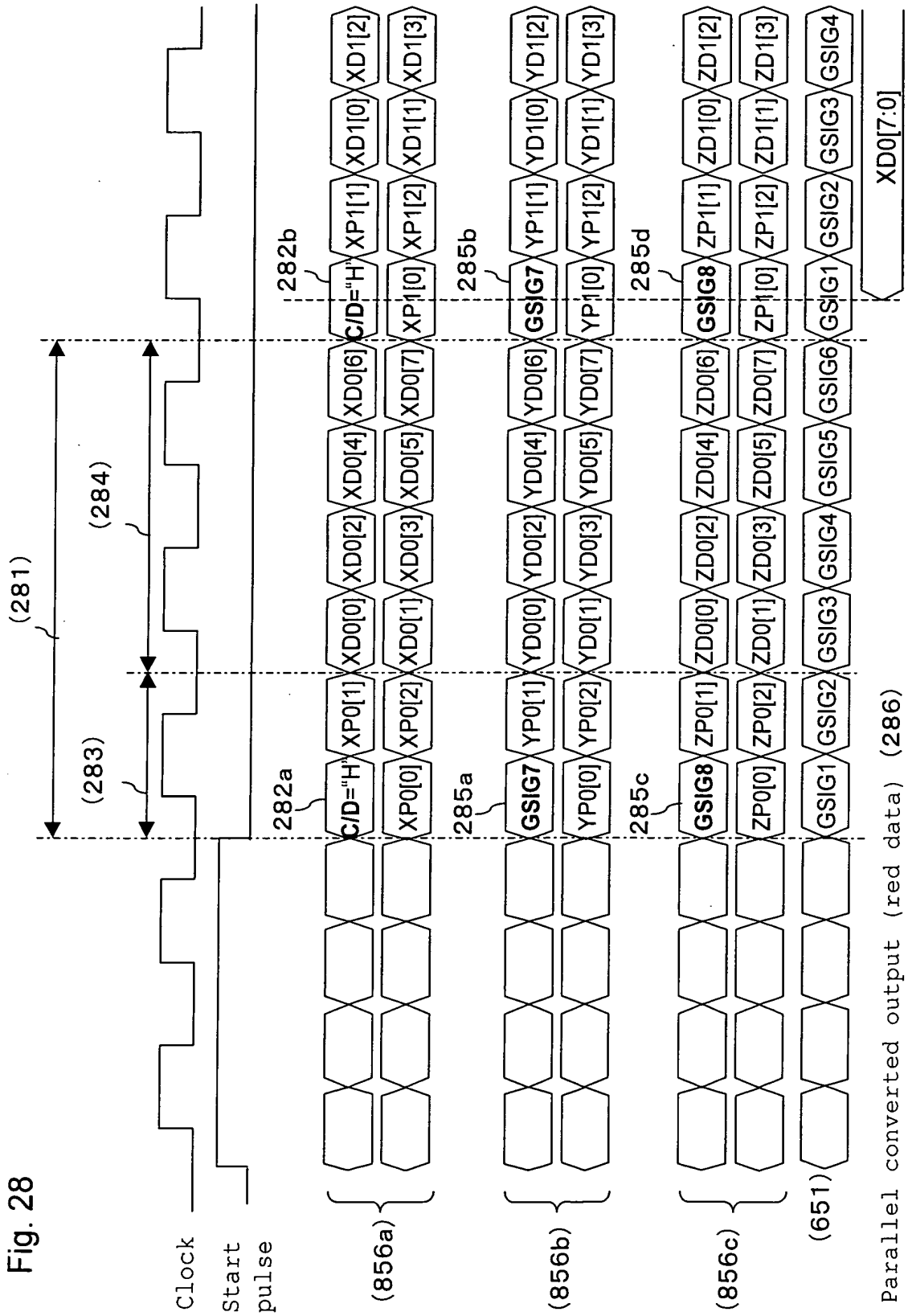


Fig. 30

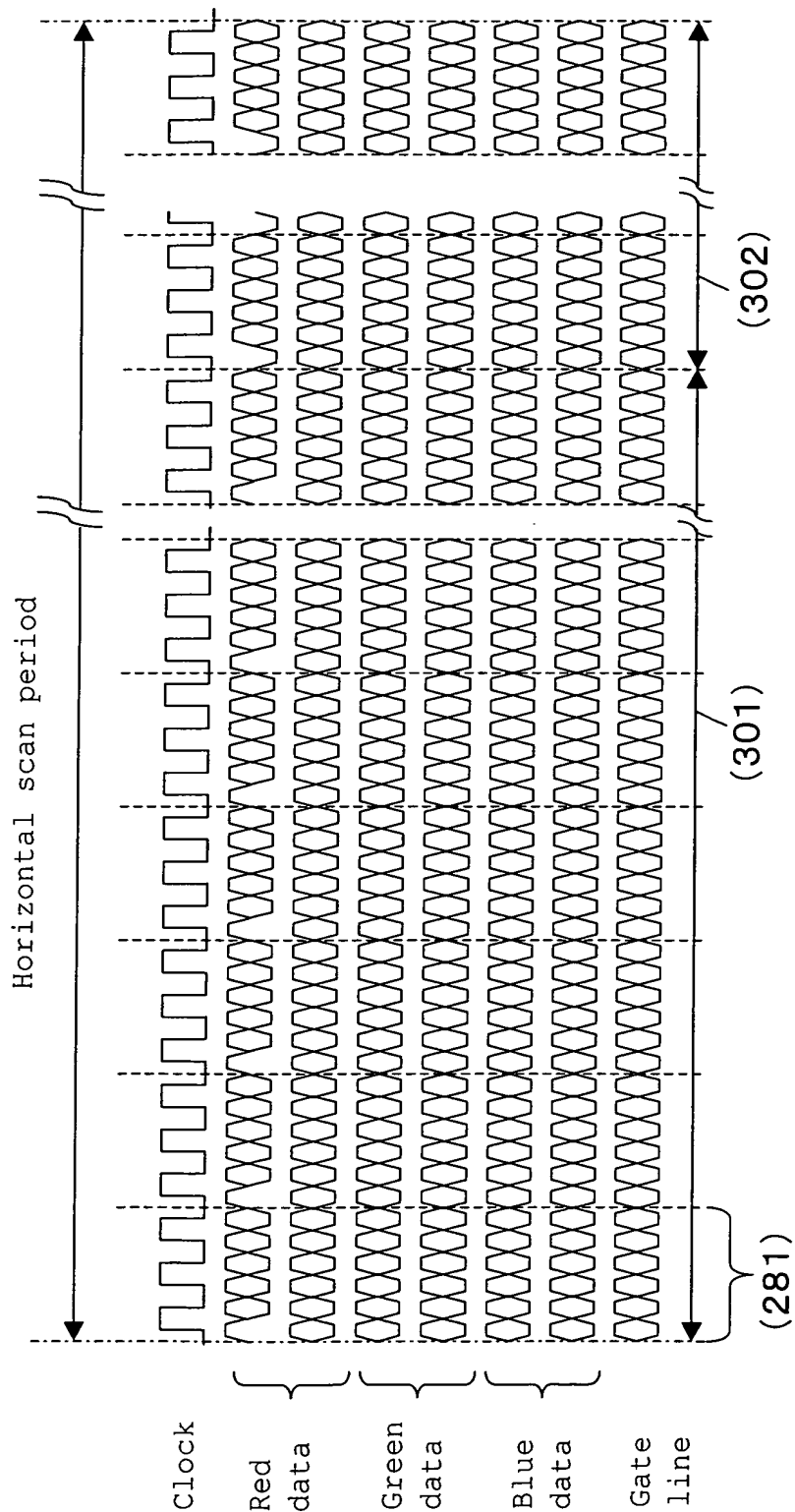


Fig. 31

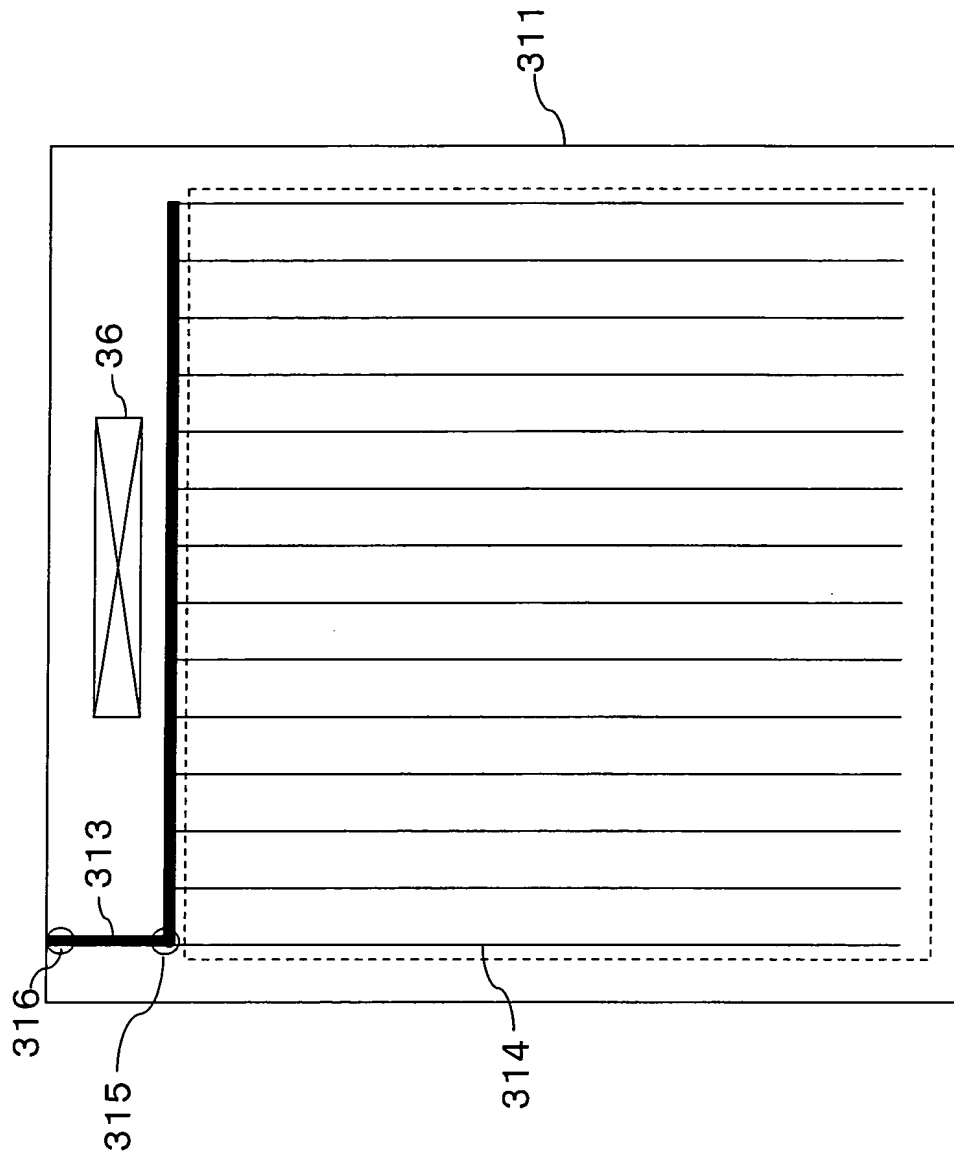
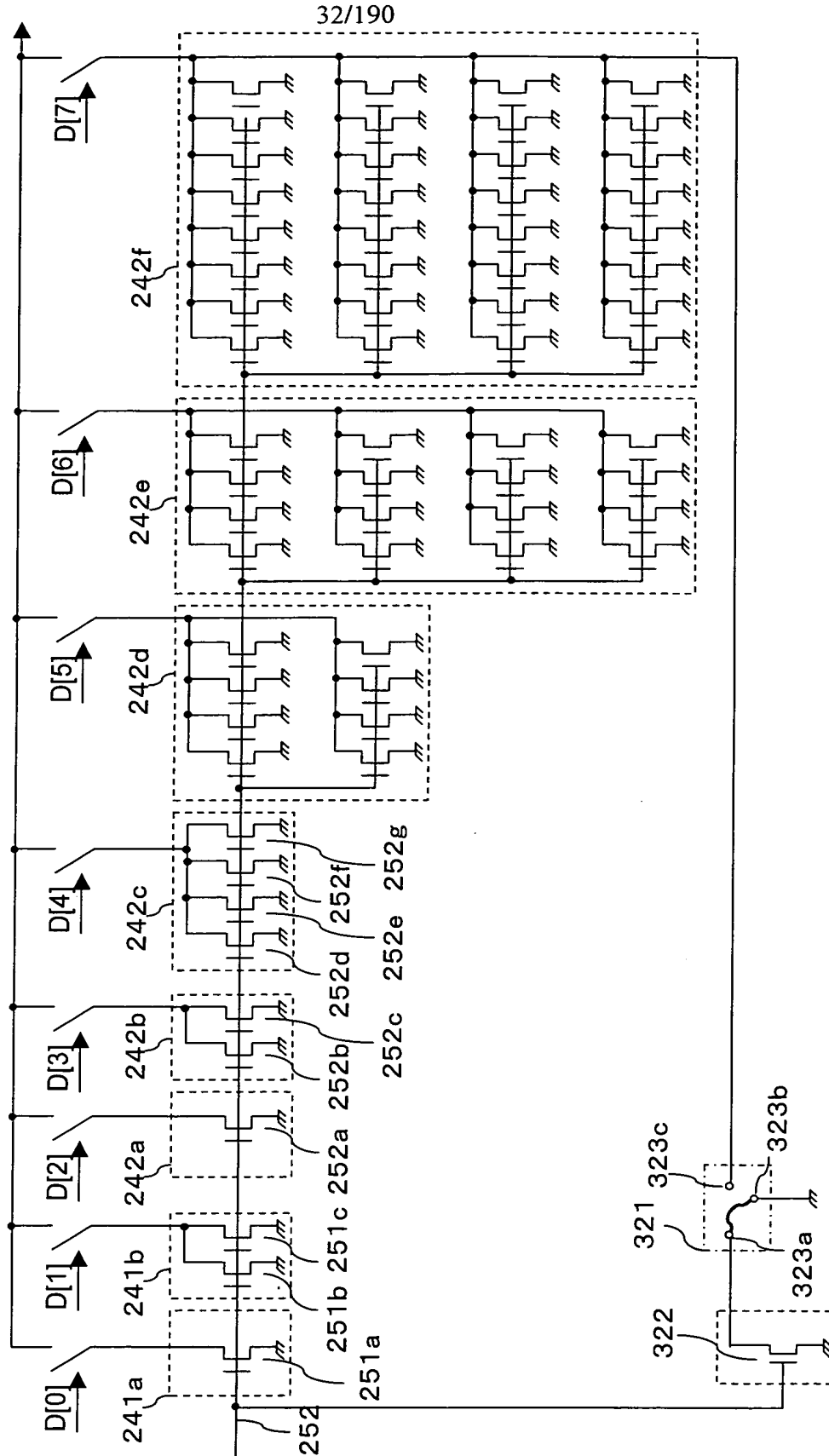


Fig. 32



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Fig. 33

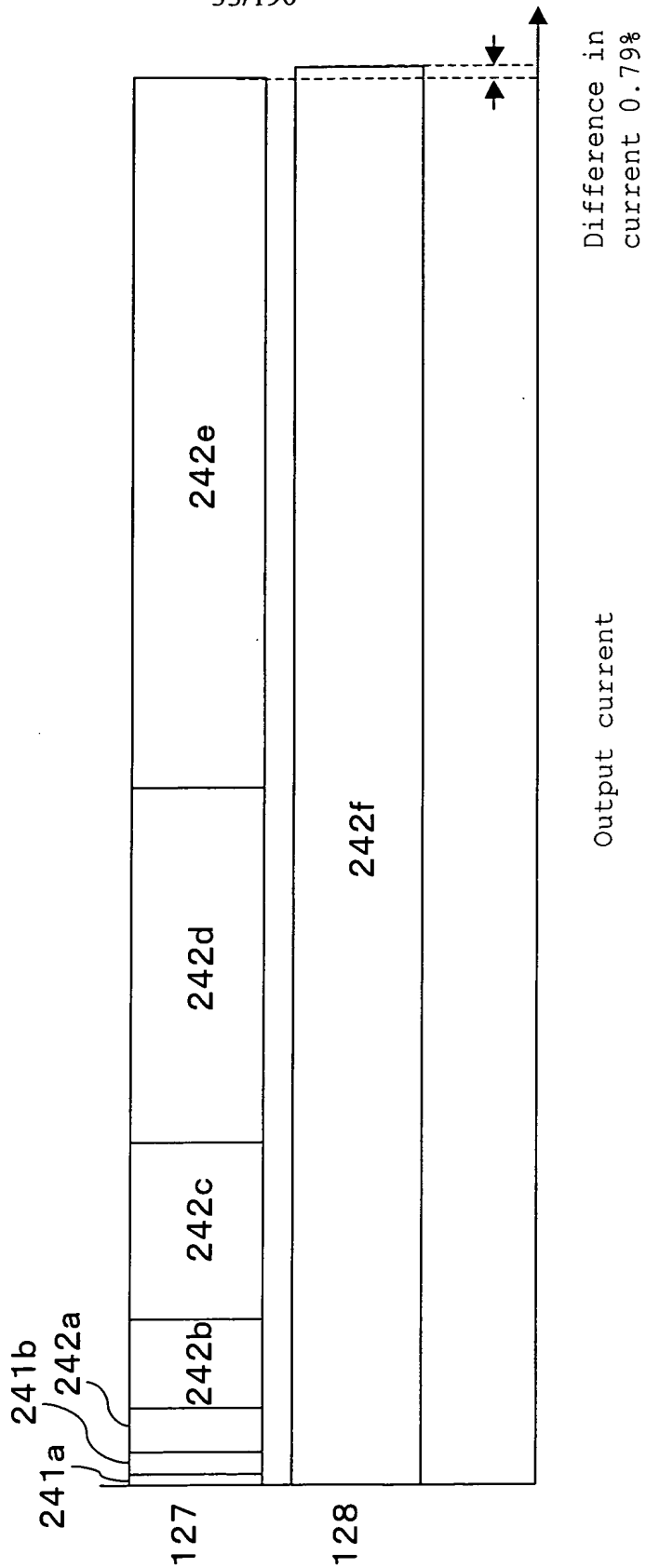


Fig. 34

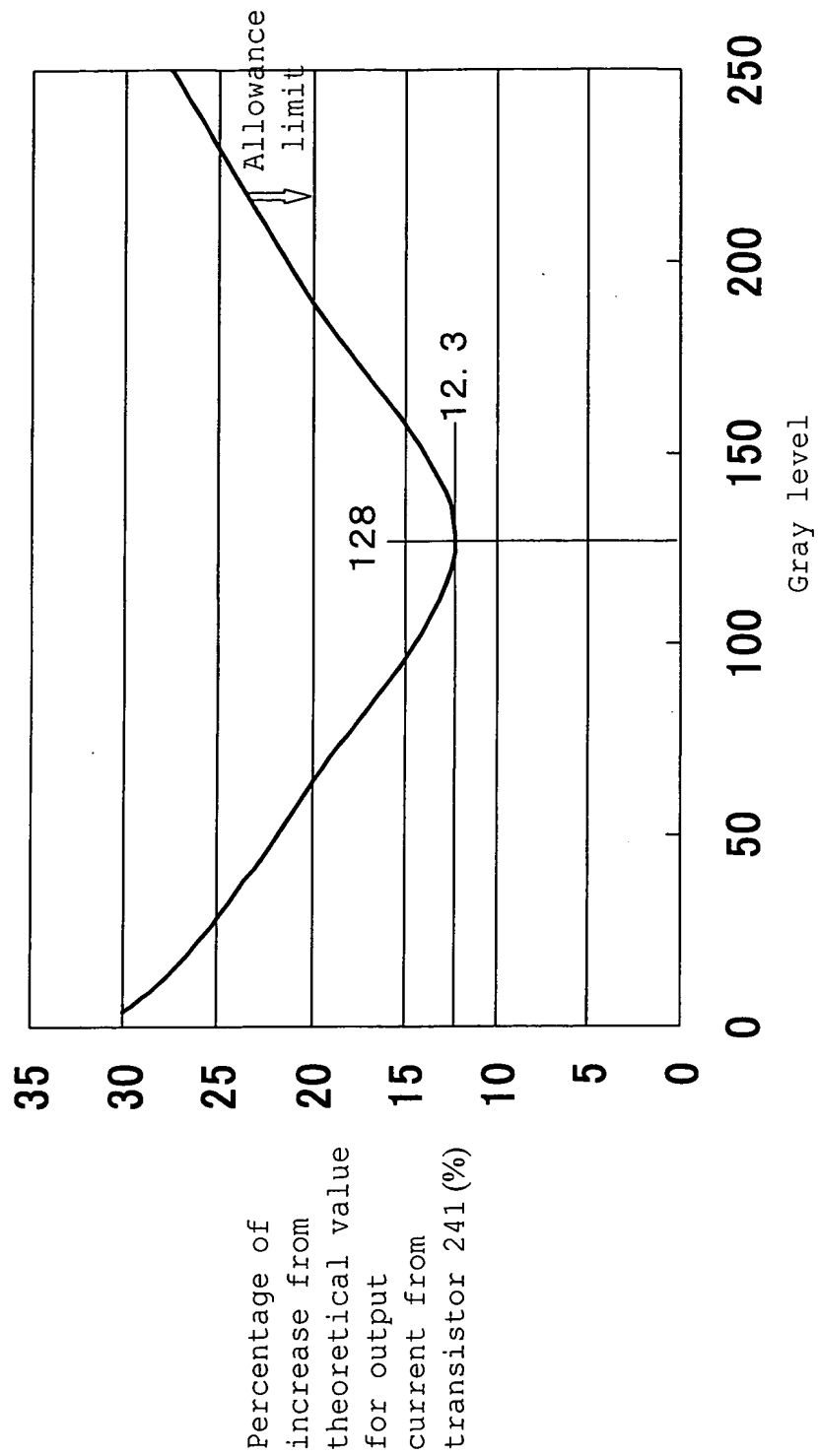


Fig. 35

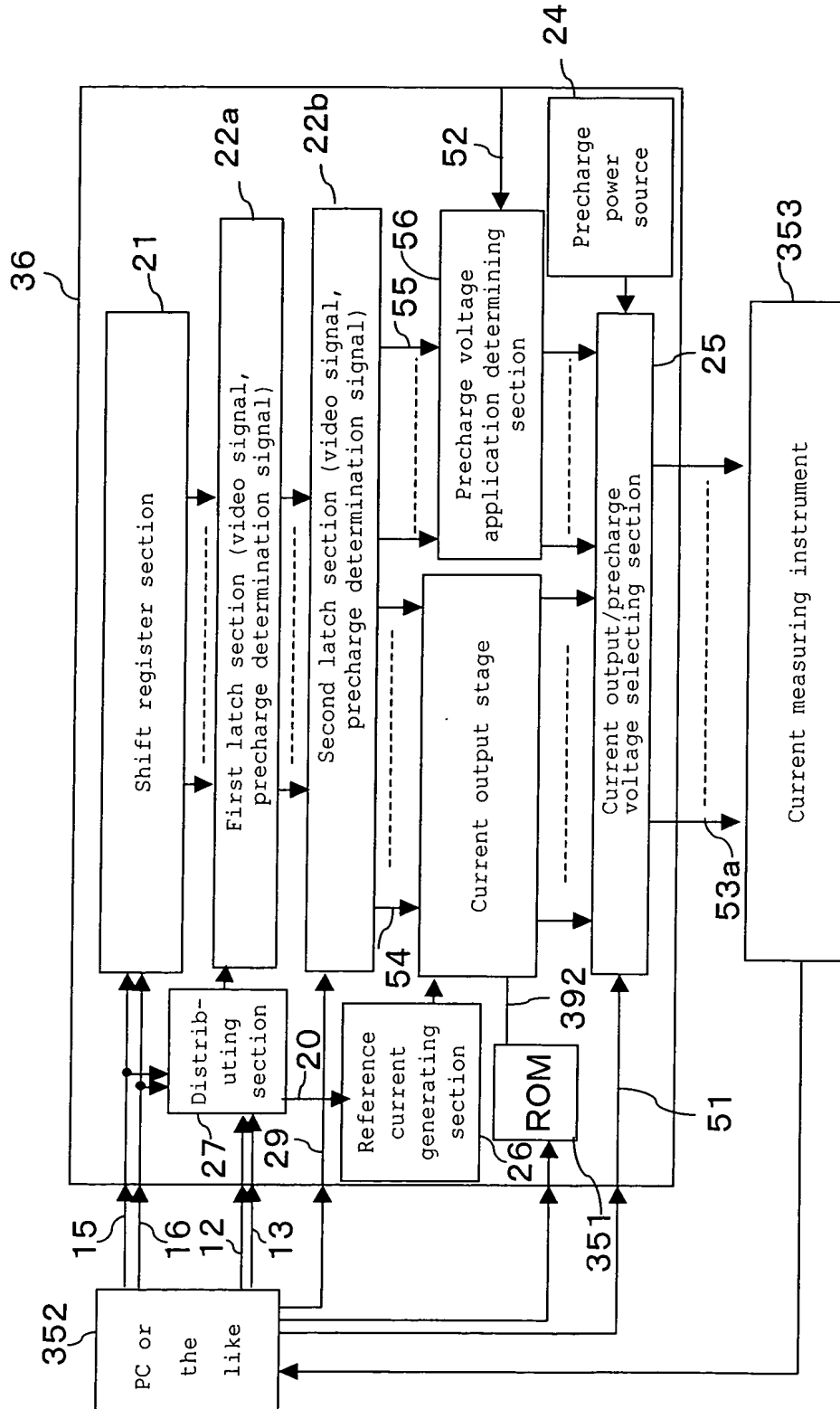
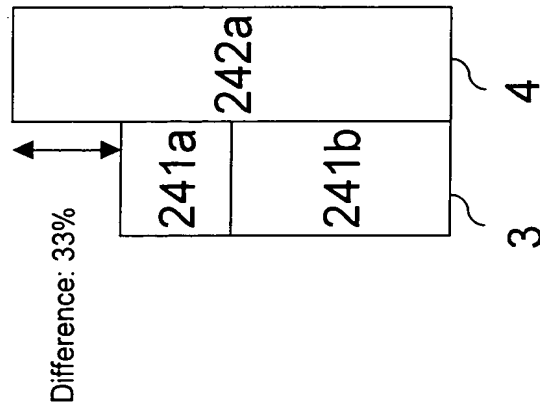


Fig. 36



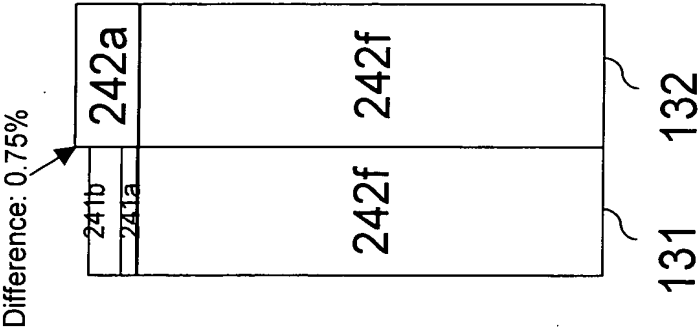
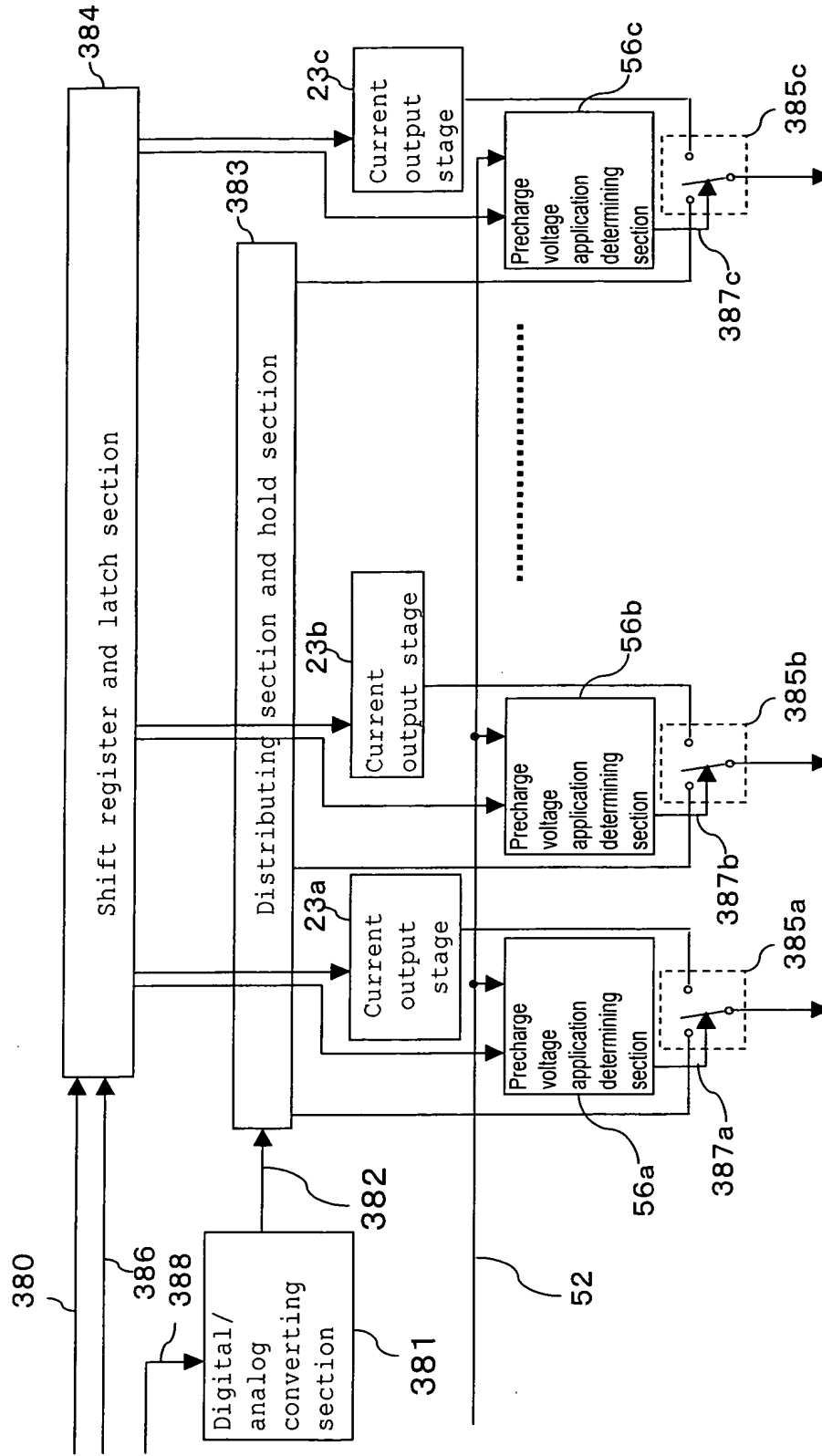


Fig. 37

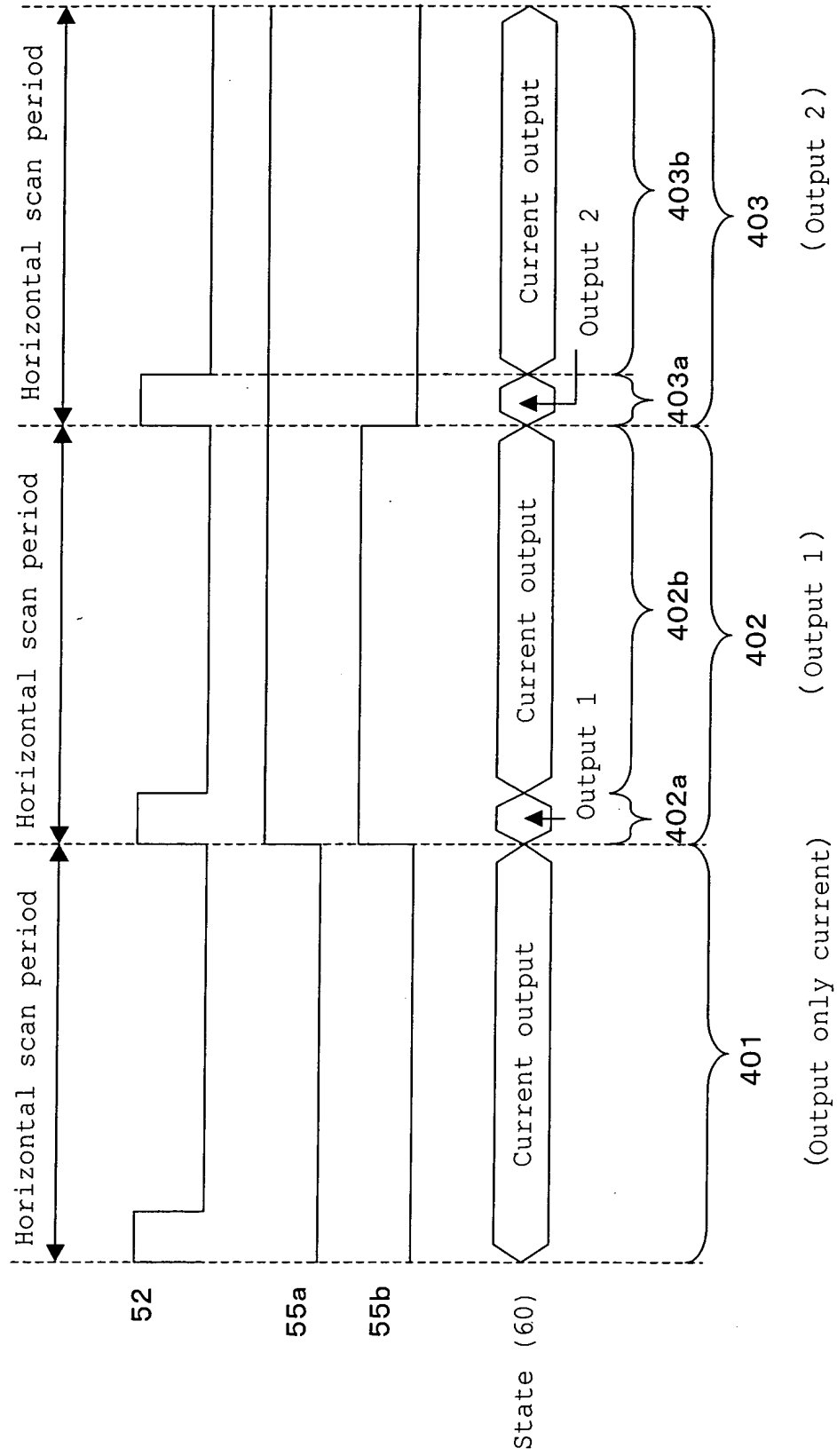
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Fig. 38



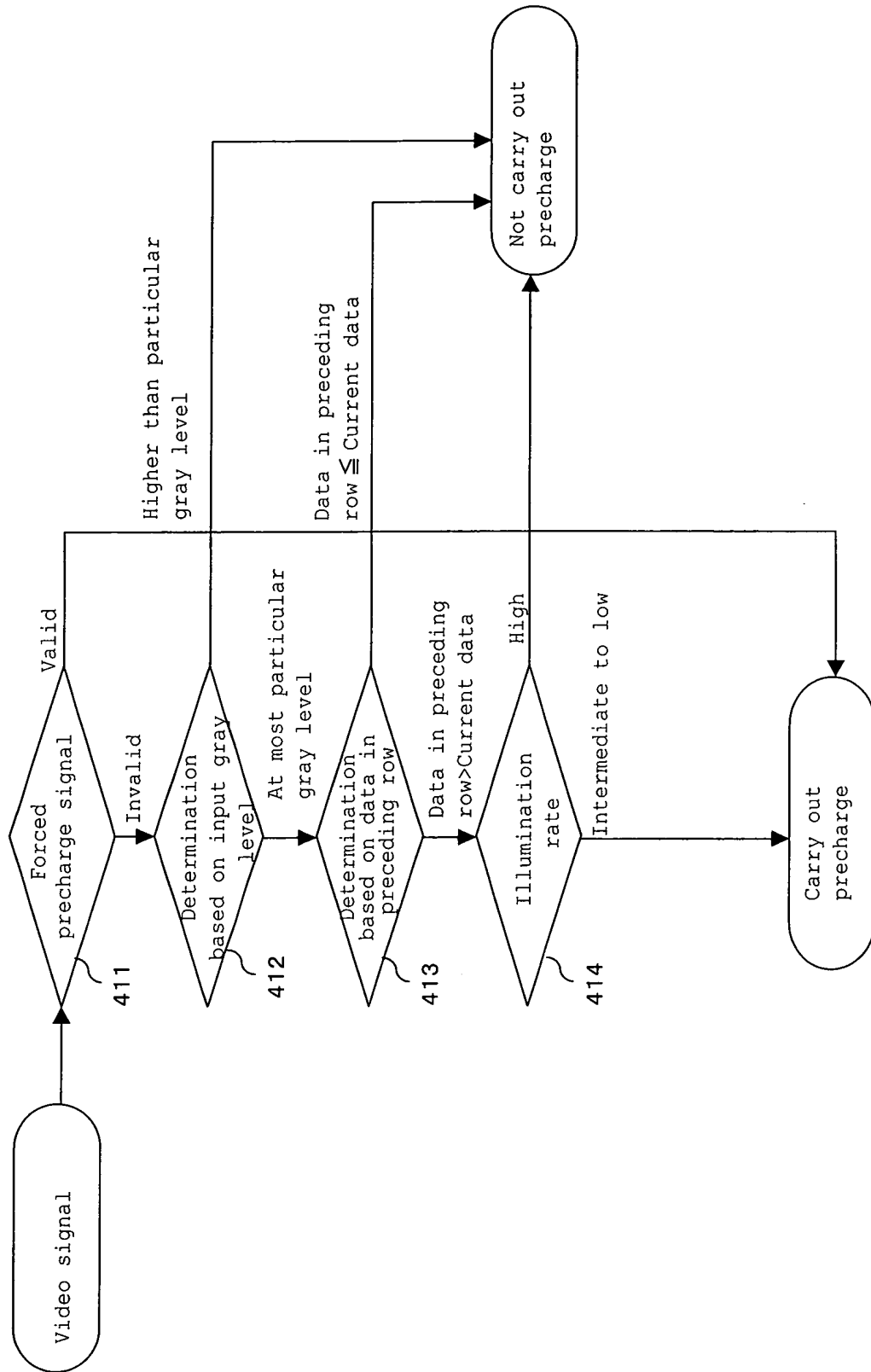
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Fig. 40



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Fig. 41



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Fig. 42

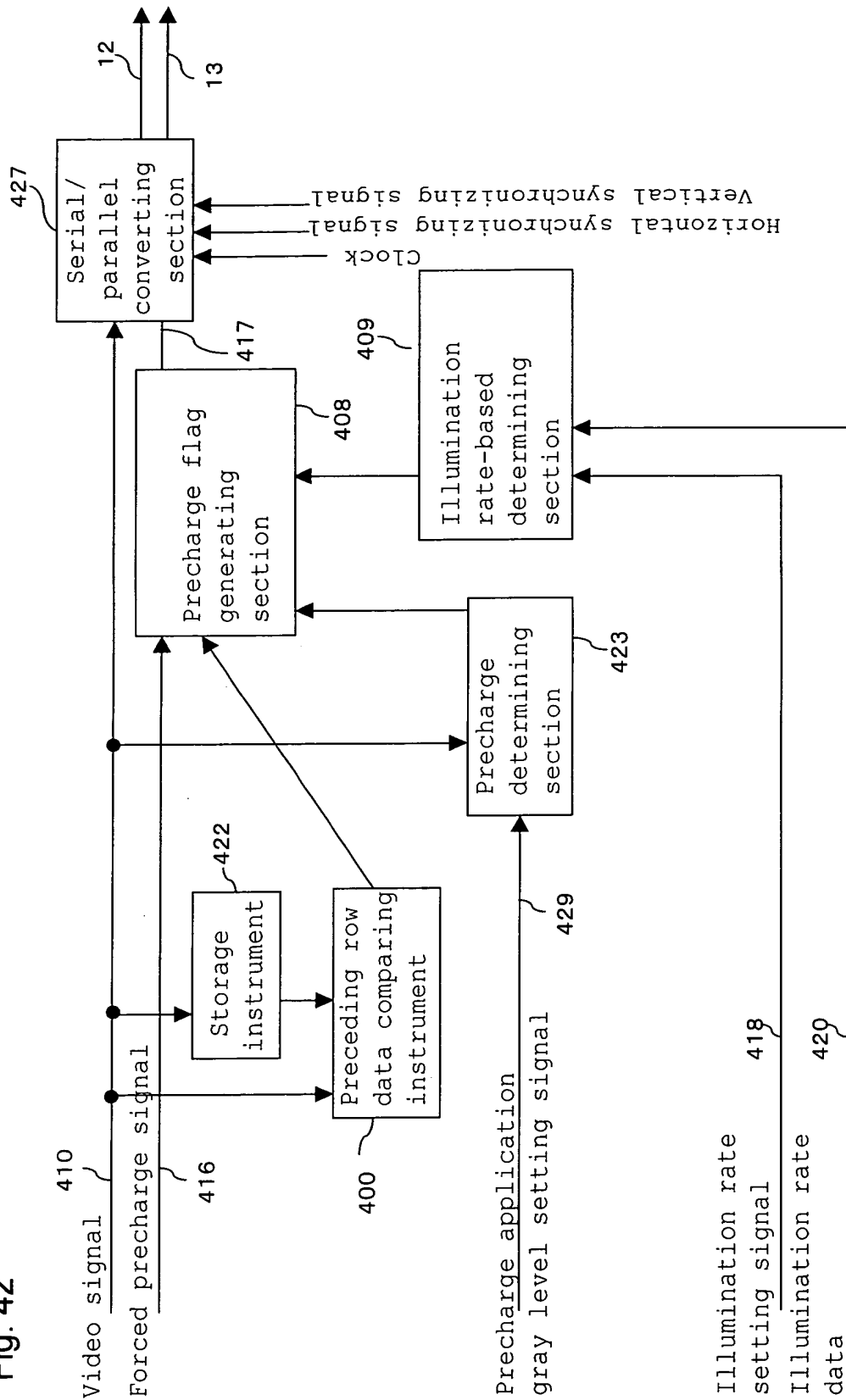


Fig. 43

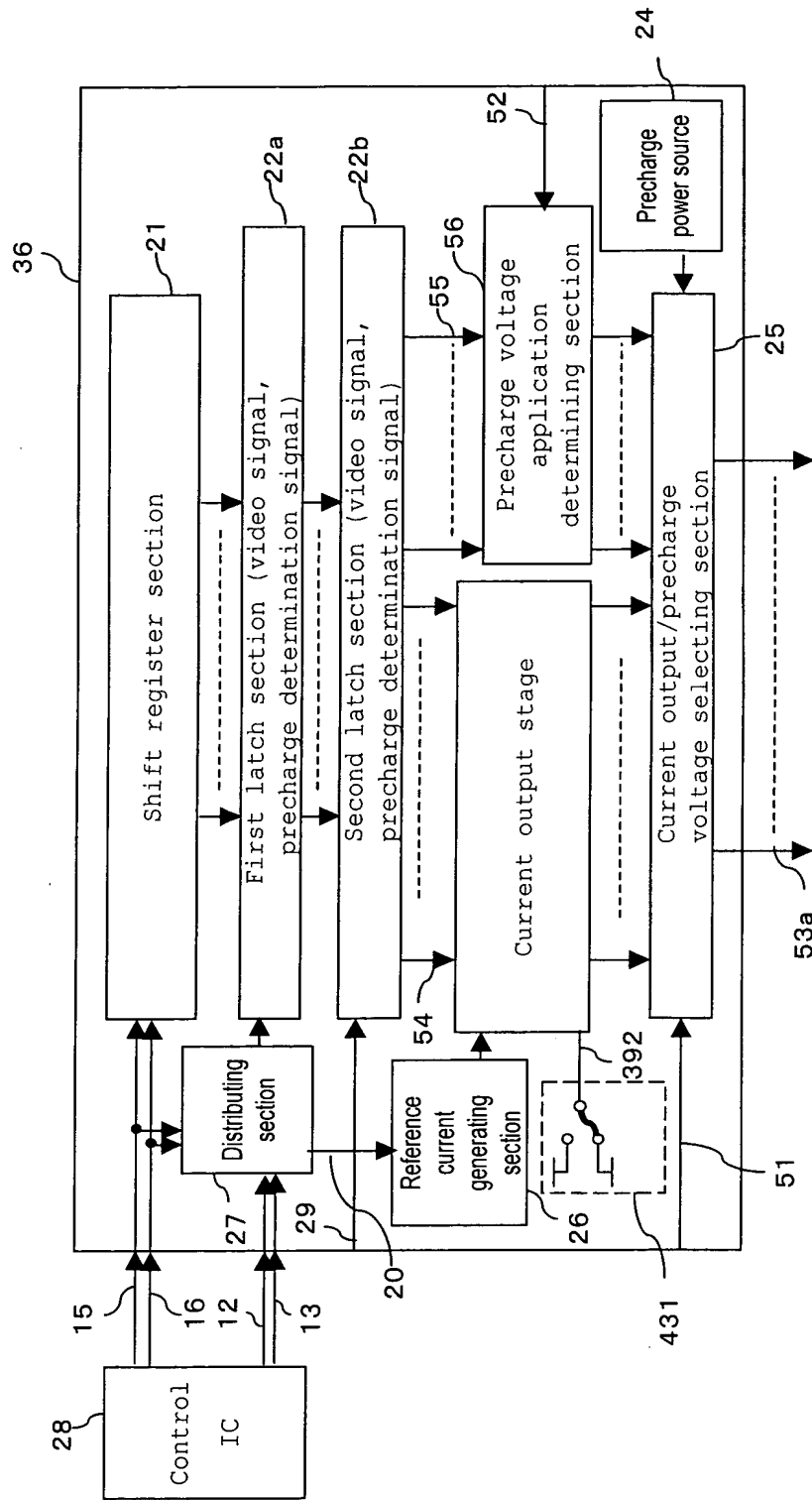
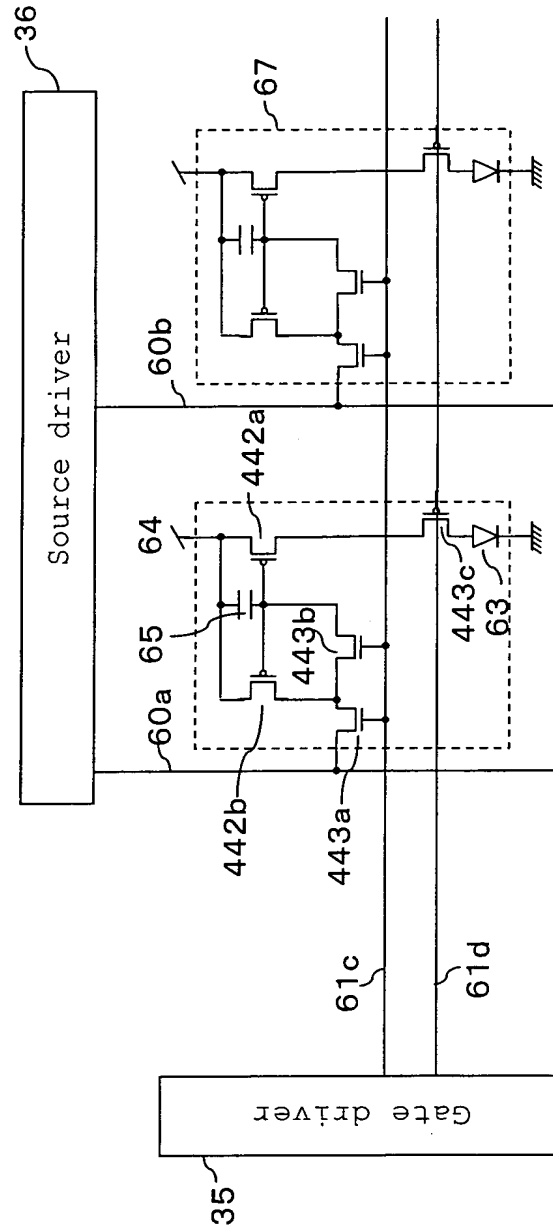


Fig. 44



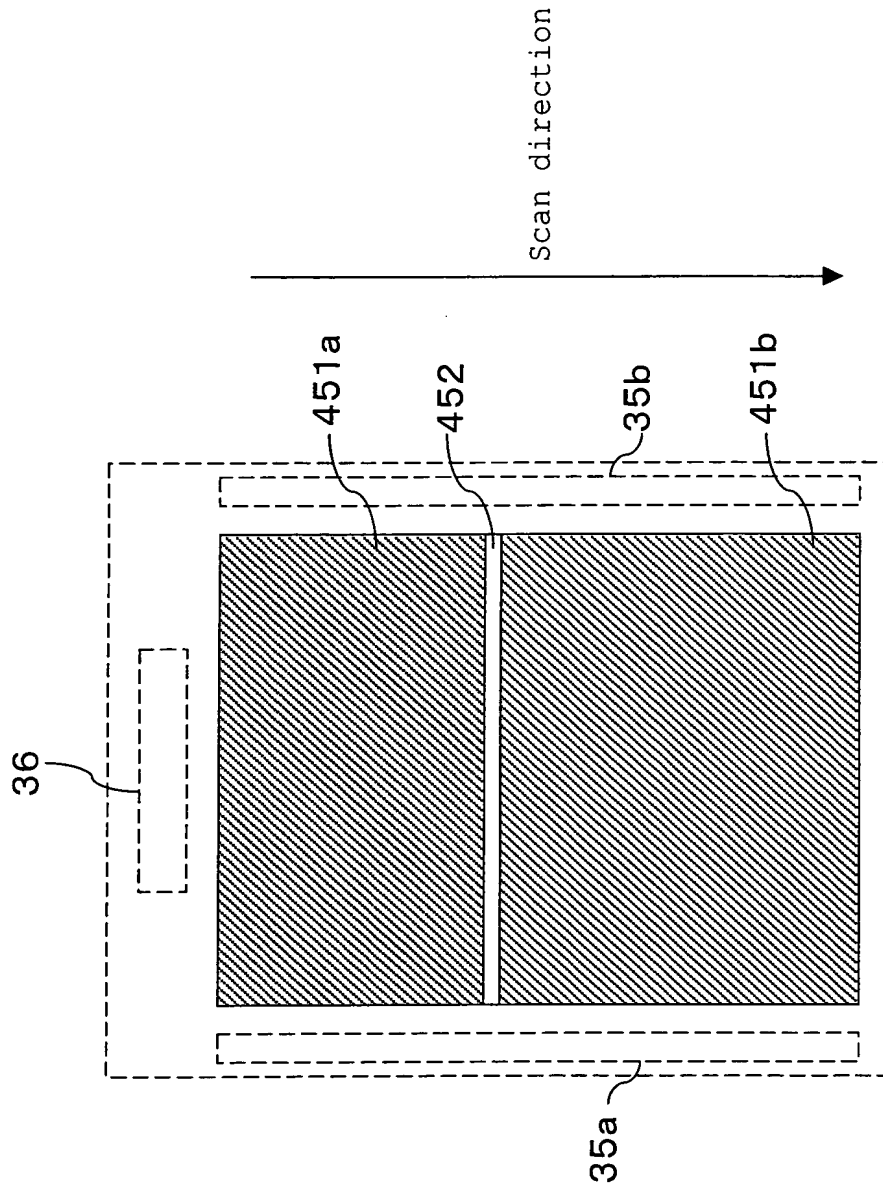


Fig. 45

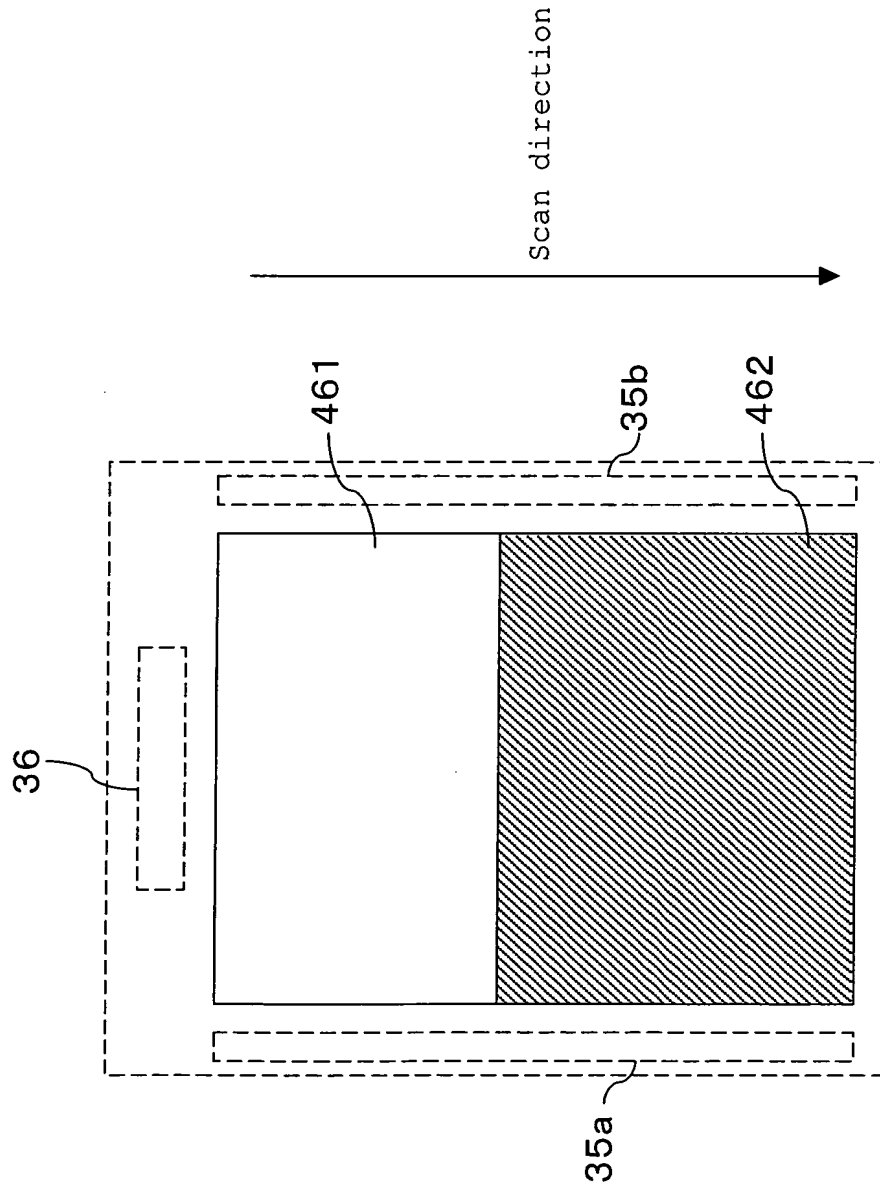


Fig. 46

Fig. 47

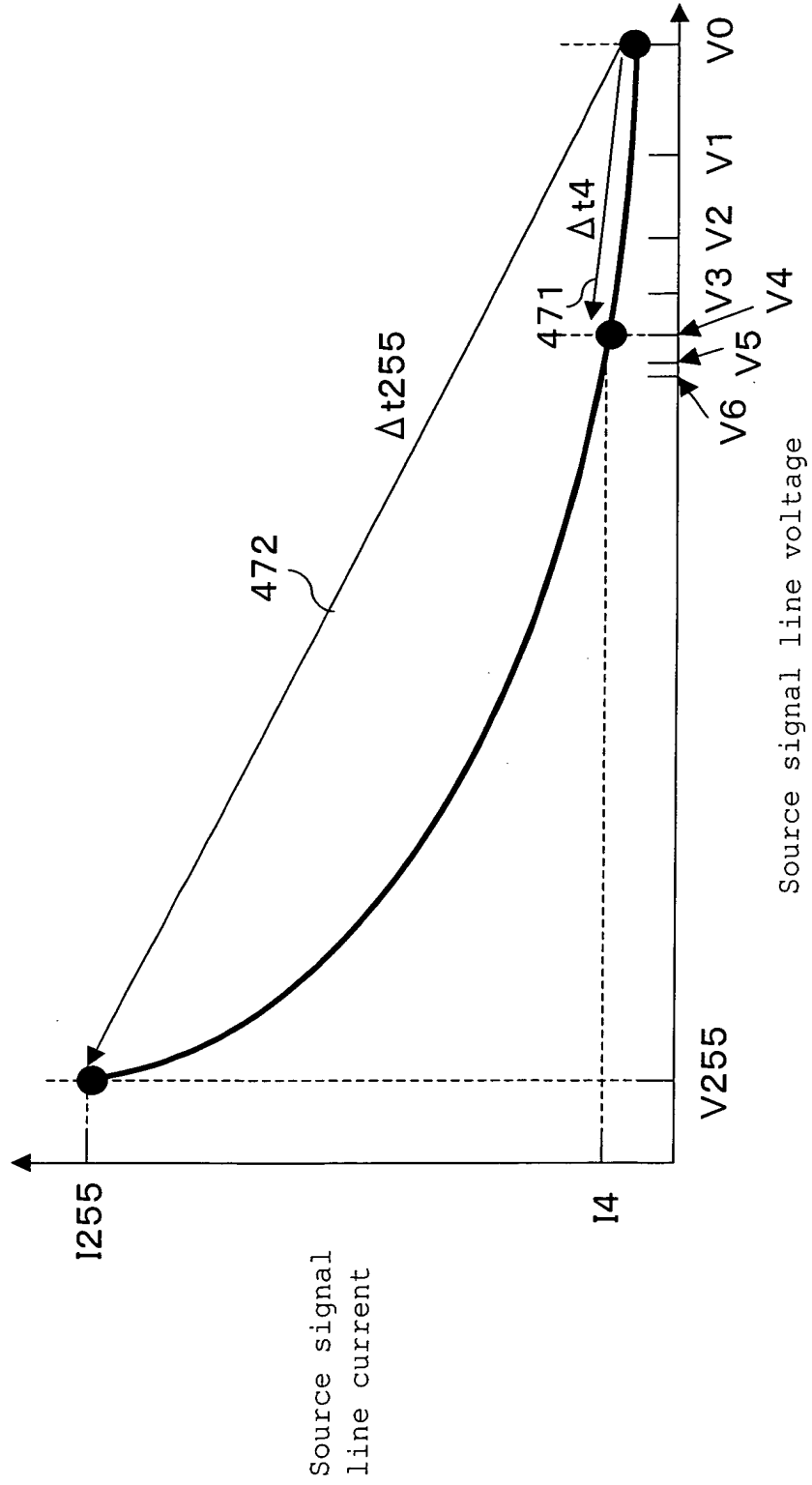


Fig. 48

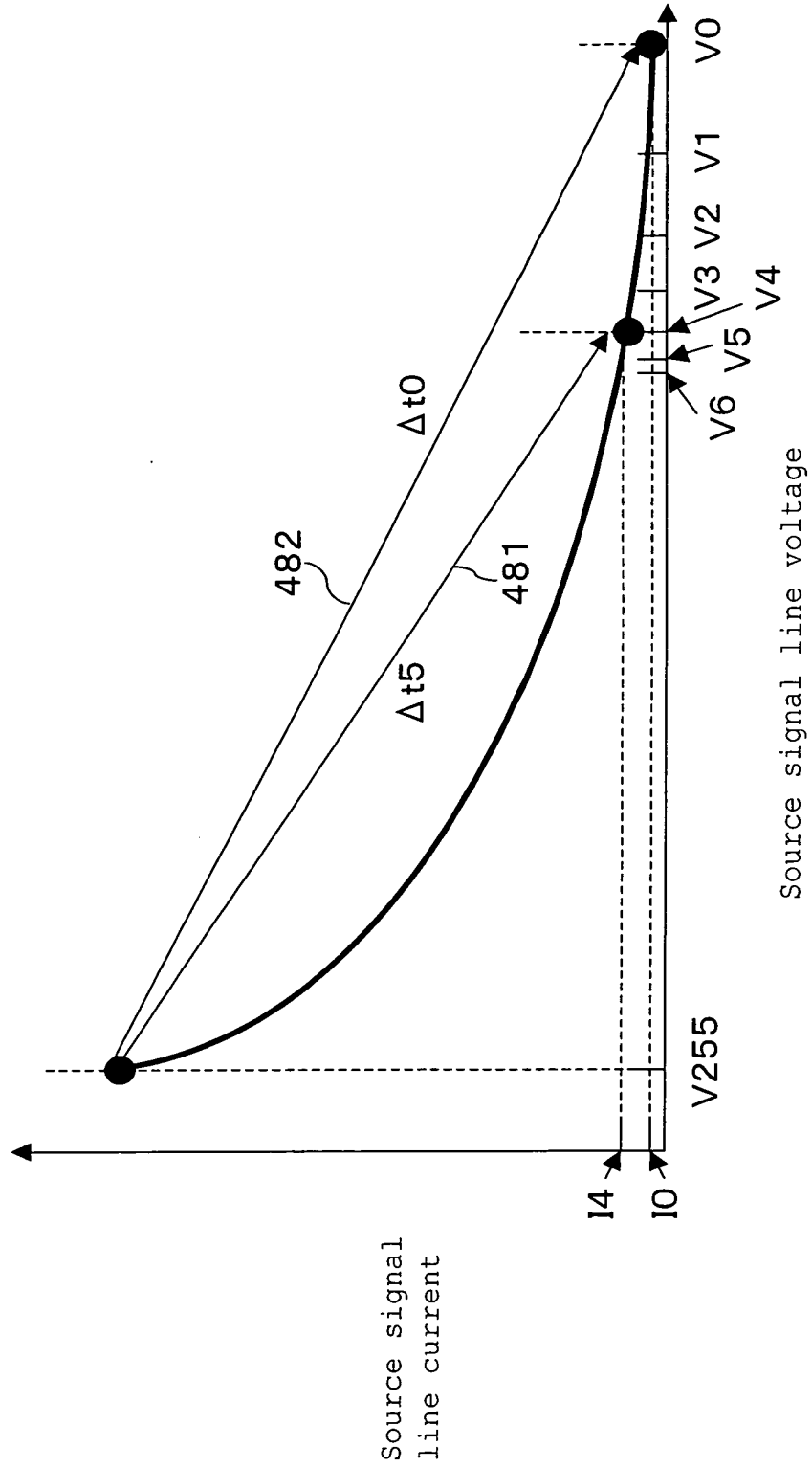
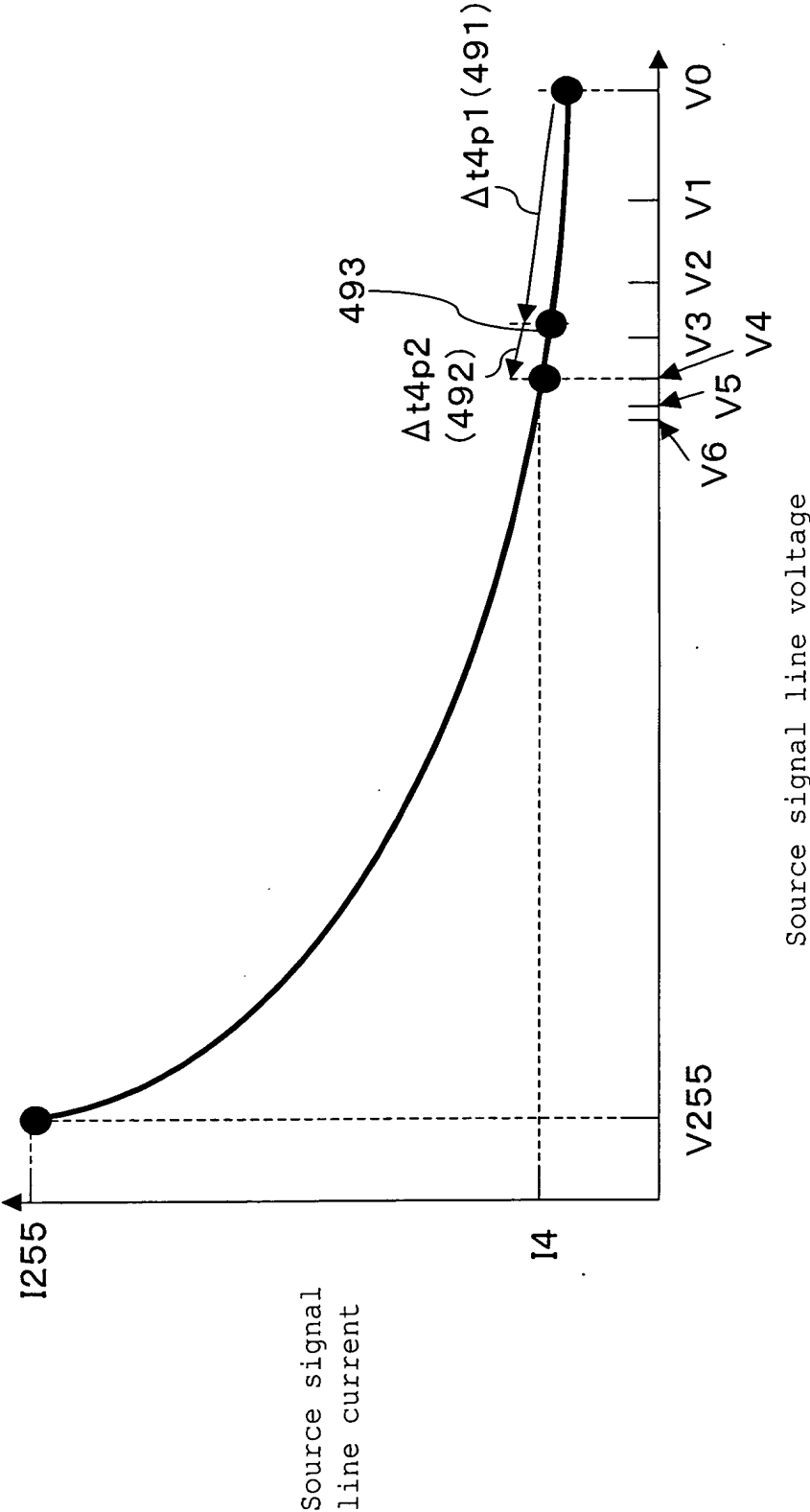


Fig. 49



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Fig. 50

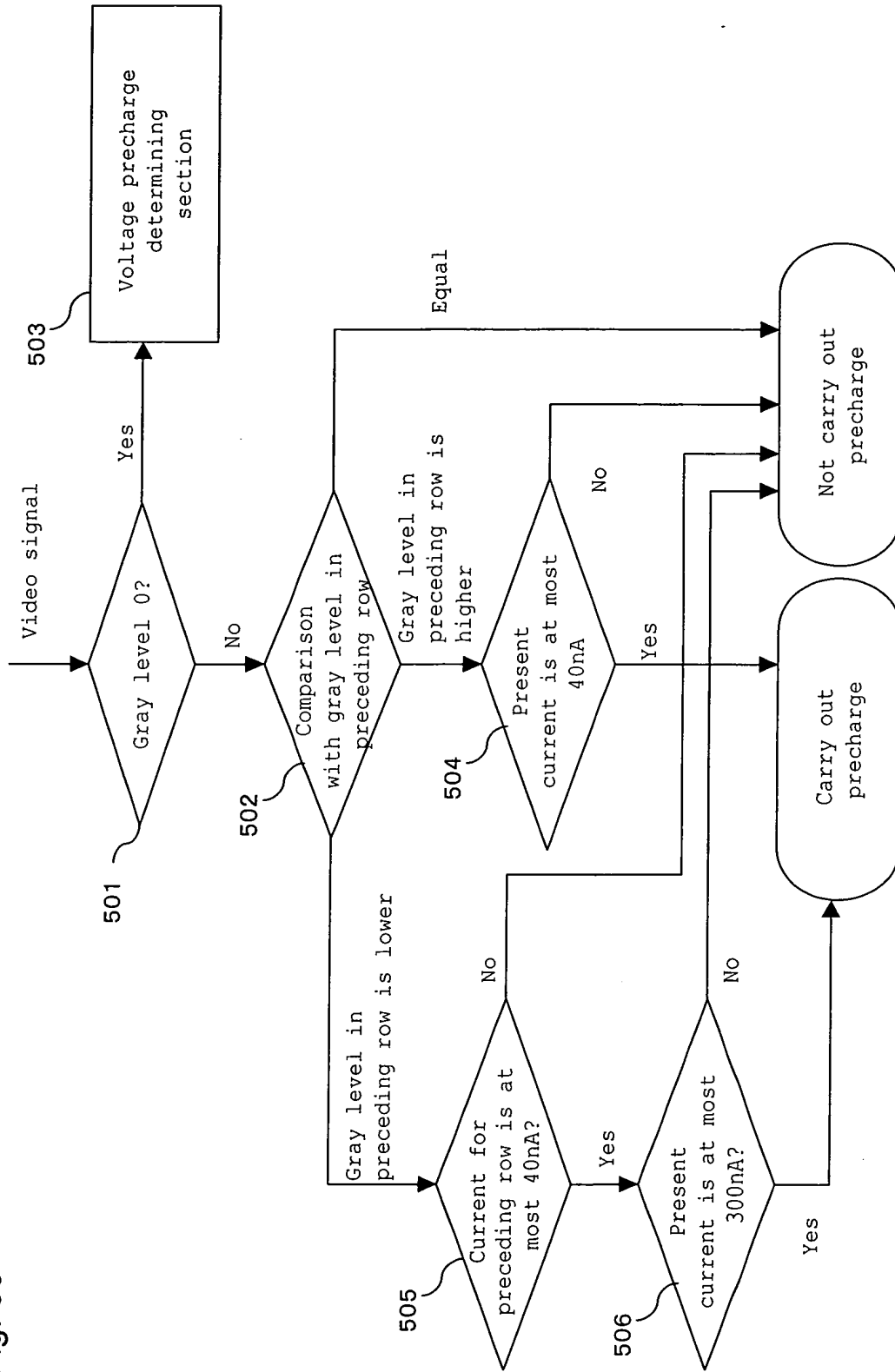
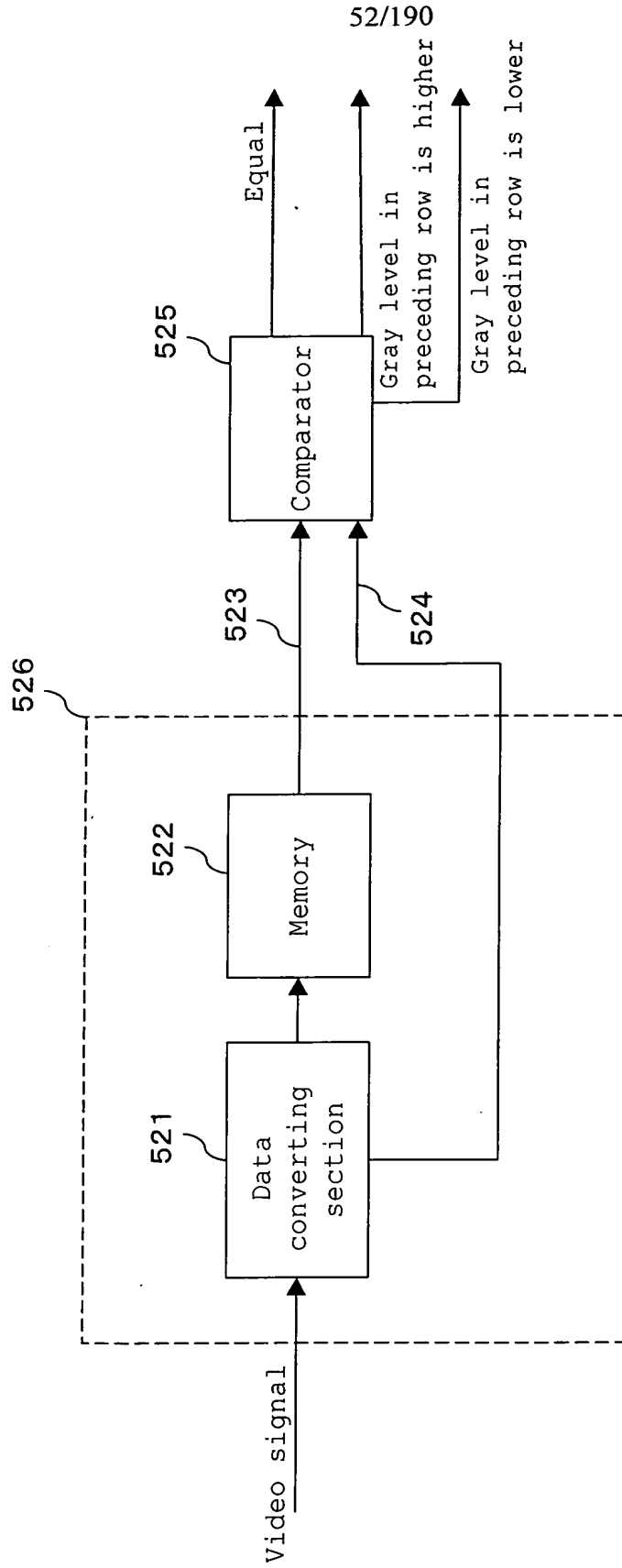


Fig. 51

Gray level of video signal	Data written to memory
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
Equal to or more than 16	15

Fig. 52



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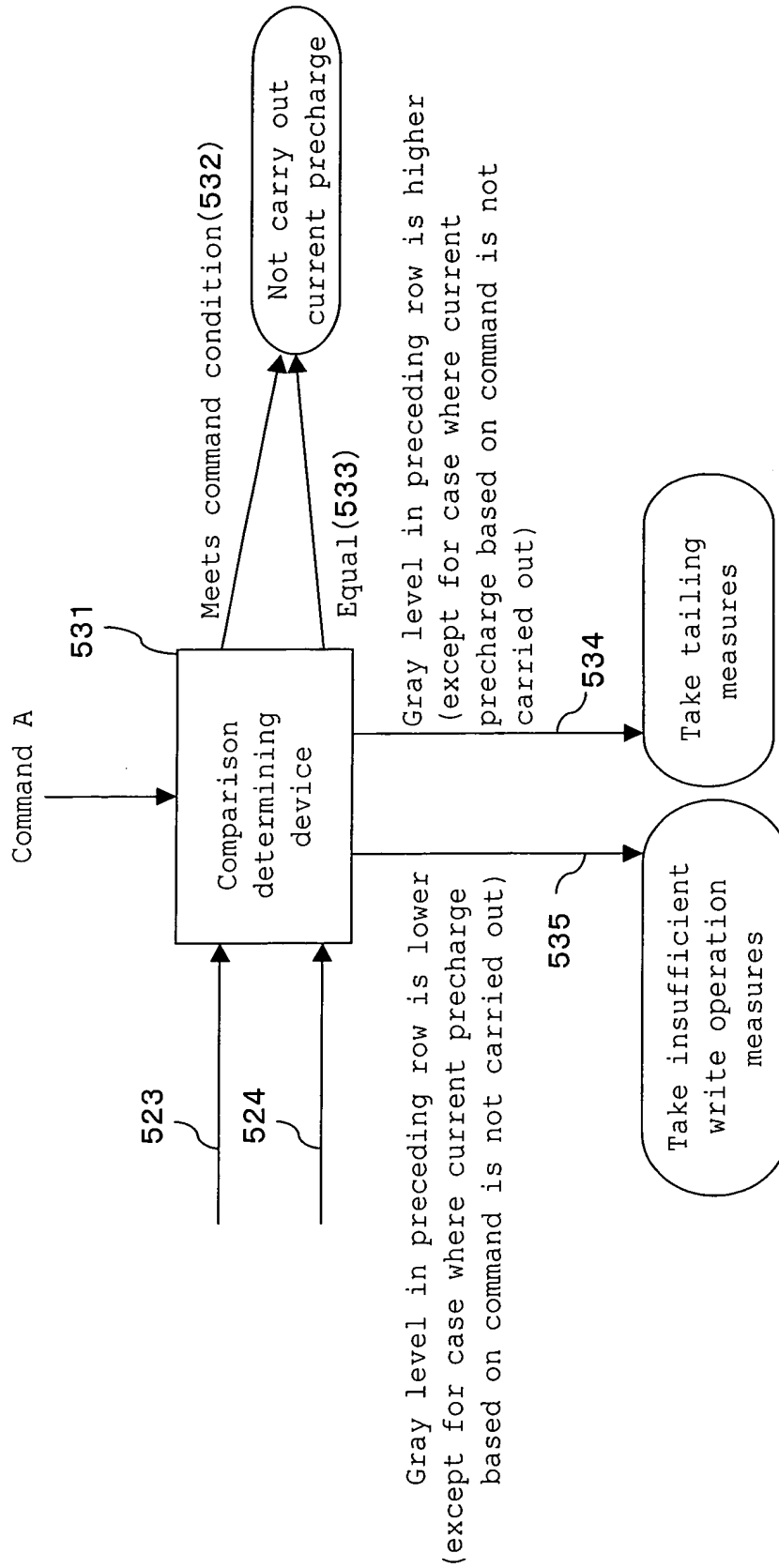


Fig. 53

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Fig. 54

Value for command A	Operation
0	Not carry out current precharge (for all combinations)
1	Not carry out current precharge if difference in gray level from data in preceding row is 1
2	Not carry out current precharge if difference in gray level from data in preceding row is 1 but carry out current precharge if change is from gray level 0 to gray level 1
3	Not carry out current precharge if difference in gray level from data in preceding row is at most 2
4	Not carry out current precharge if difference in gray level from data in preceding row is at most 2 but carry out current precharge if change is from gray level 0 to gray level 2

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Fig. 55

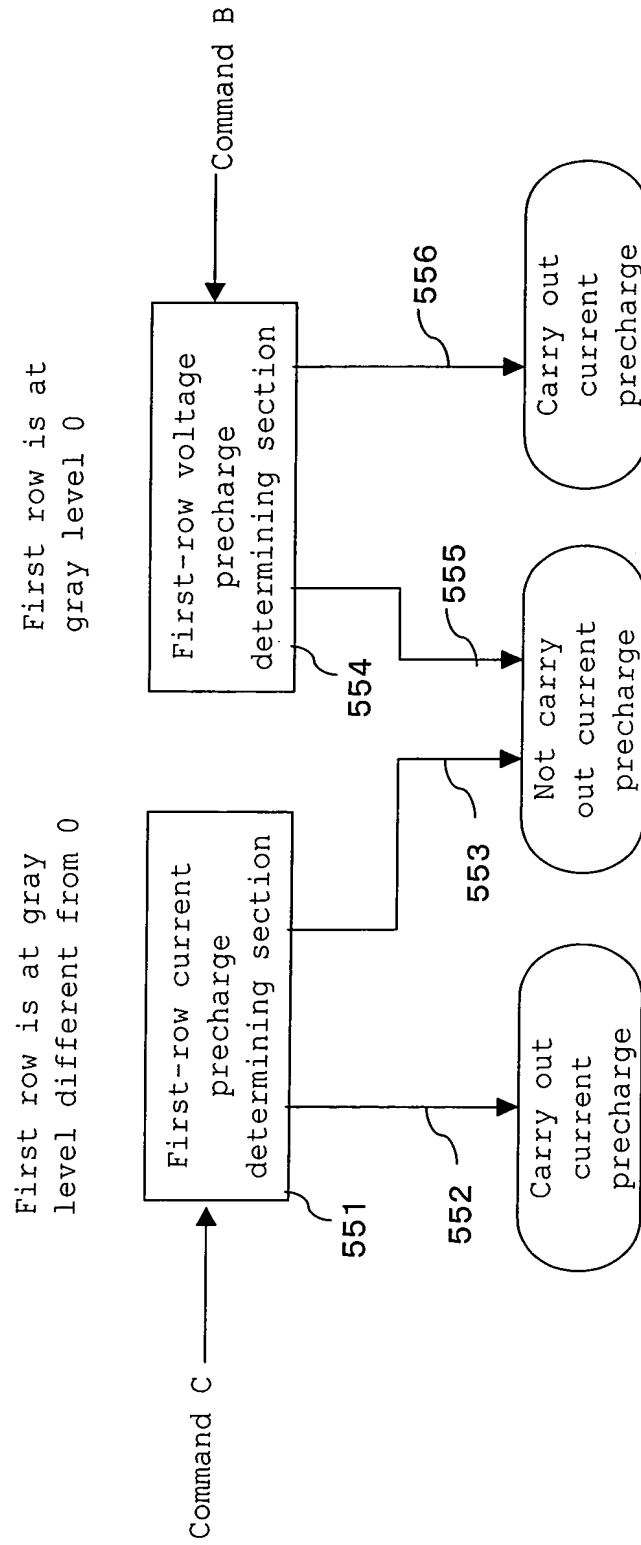


Fig. 56

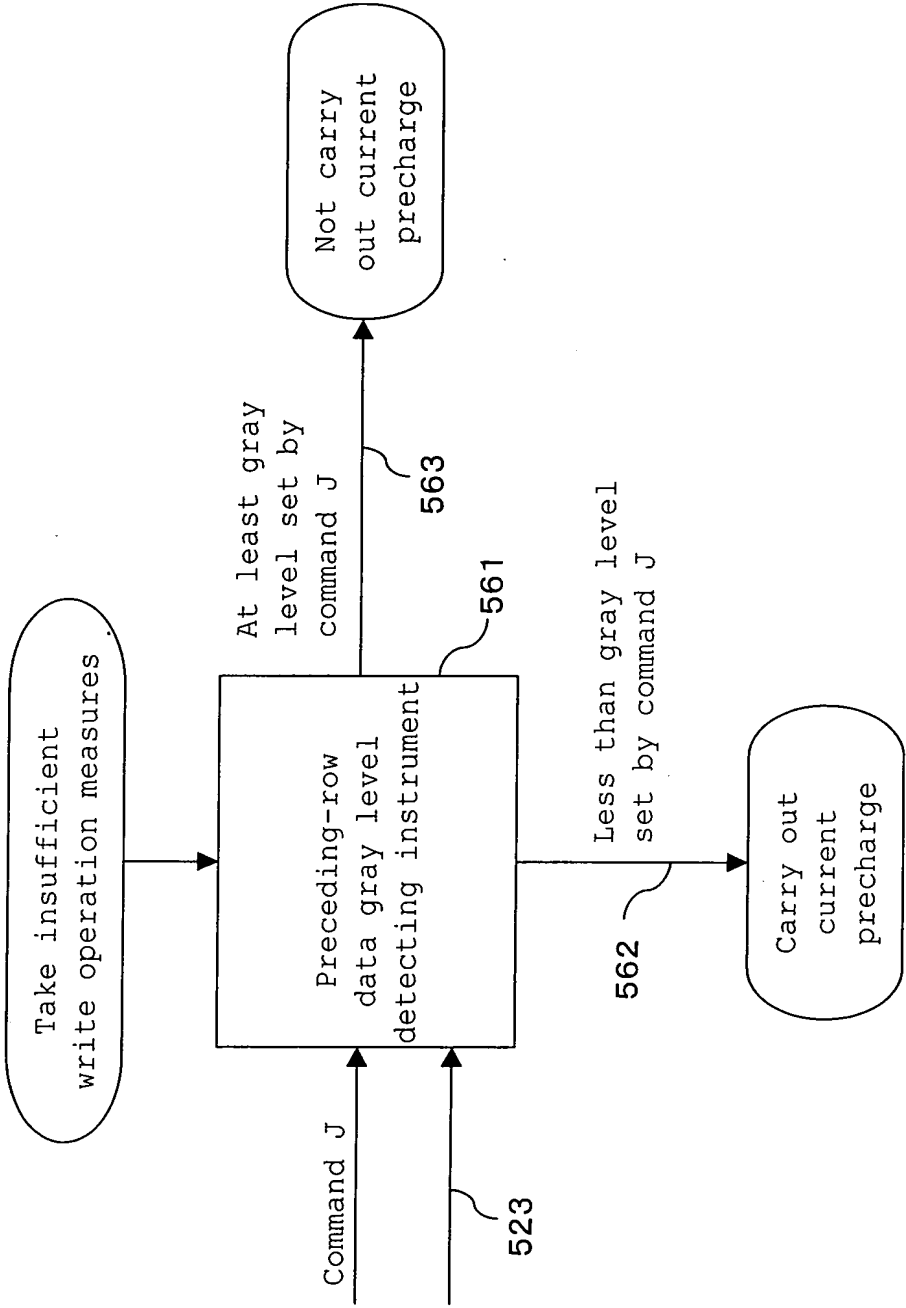
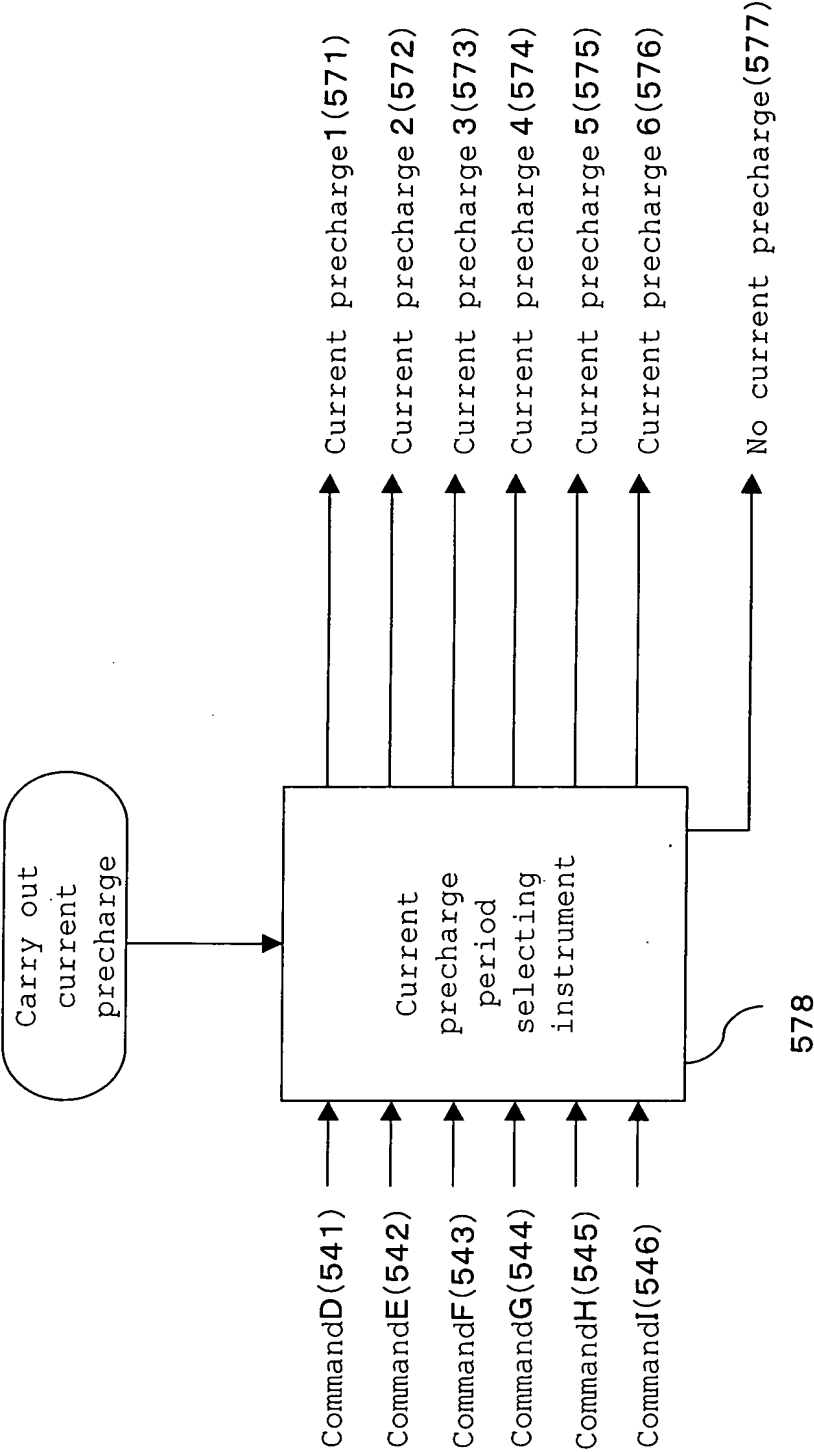
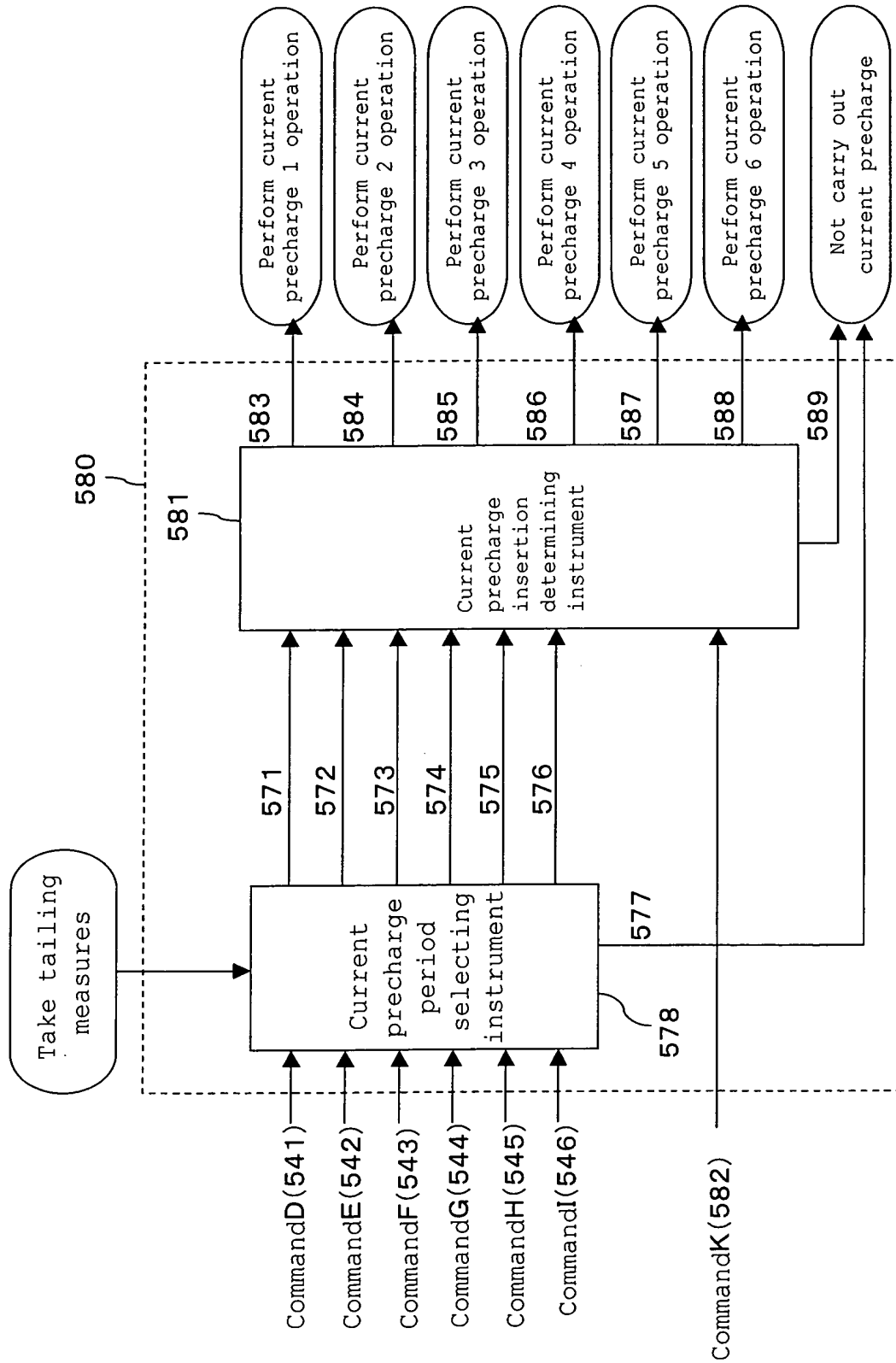


Fig. 57



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Fig. 58



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Fig. 59

Value for command K	Precharge pattern
0	Same as input current precharge pattern
1	
2	Not carry out current precharge for current recharge 6 operation and same as input current precharge pattern in other cases
3	Not carry out current precharge for current precharge 5 or 6 operation and same as input current precharge pattern in other cases
4	Not carry out current precharge for current precharge 4 to 6 operations and same as input current precharge pattern in other cases
5	Not carry out current precharge for current precharge 3 to 6 operations and same as input current precharge pattern in other cases
6	Not carry out current precharge for current precharge 2 to 6 operations and same as input current precharge pattern in other cases
7	Not carry out current precharge

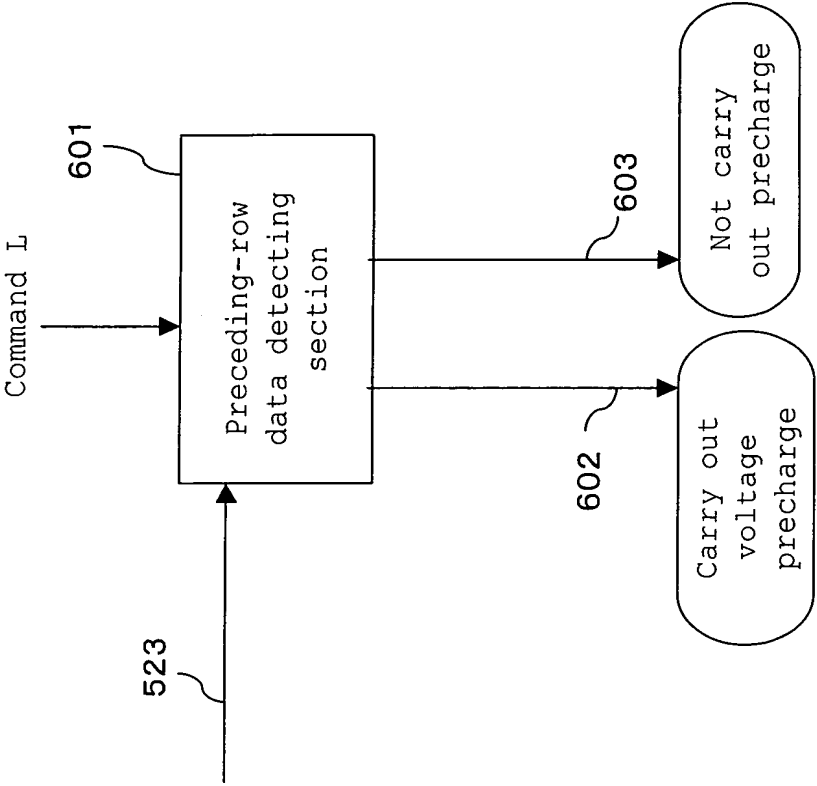


Fig. 60

Fig. 61

Value for command L	Precharge pattern
0	Not carry out voltage precharge
1	Carry out voltage precharge when data in preceding row is 0
2	Always carry out voltage precharge

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Fig. 62

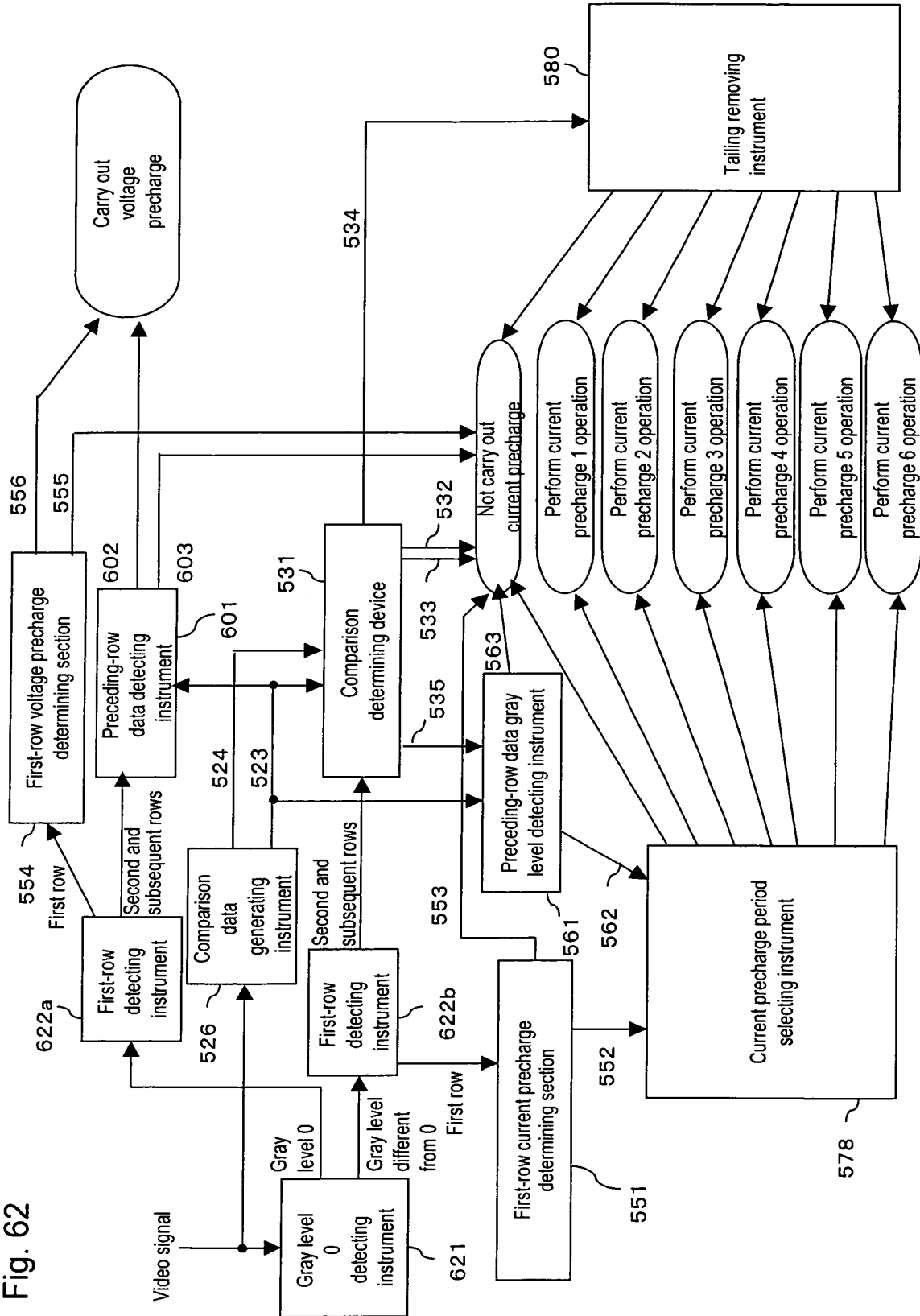
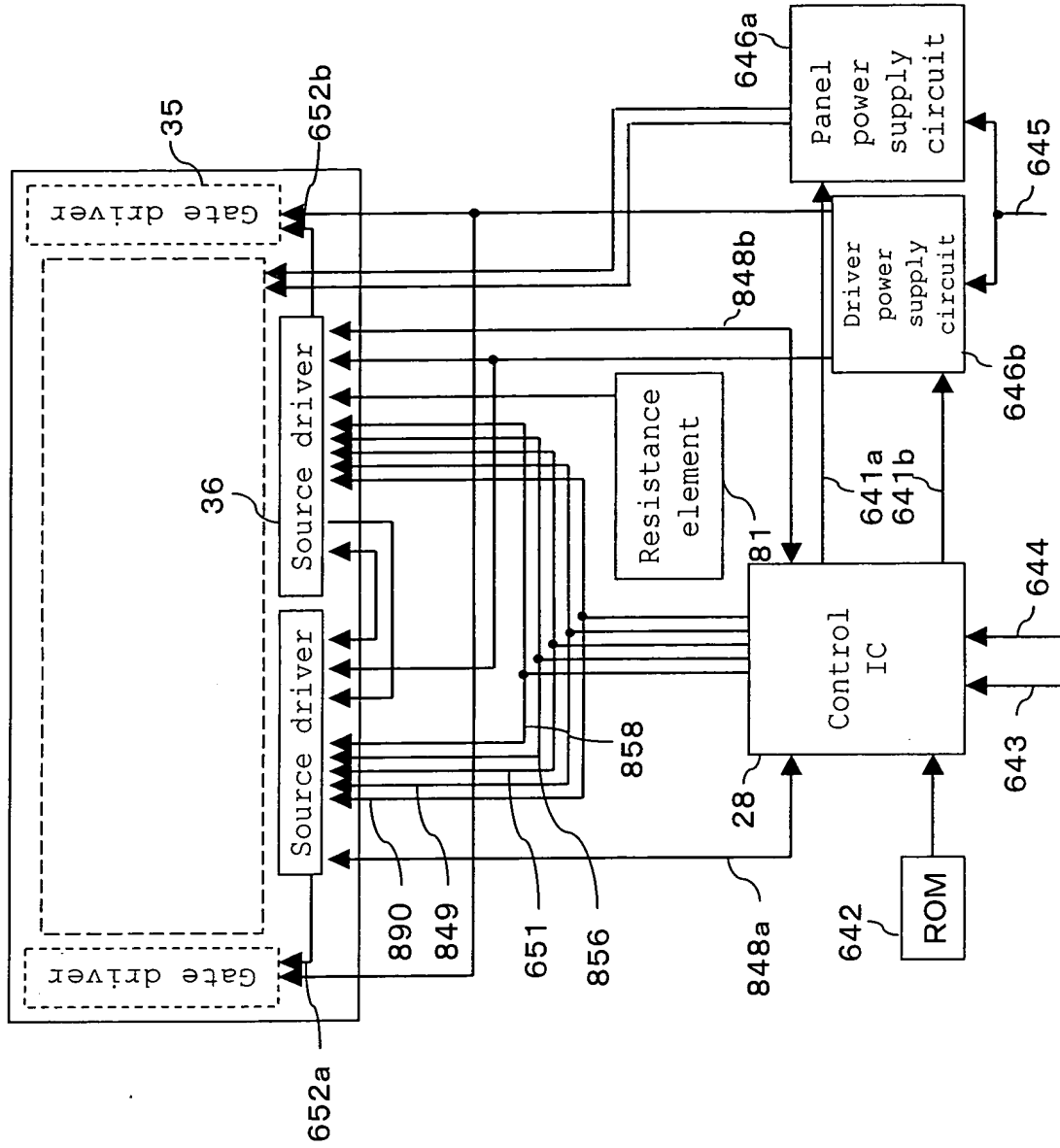


Fig. 63

Determination for precharge operation	Value for precharge determination signal (55)
Not carry out precharge	0
Perform current precharge 1 operation	1
Perform current precharge 2 operation	2
Perform current precharge 3 operation	3
Perform current precharge 4 operation	4
Perform current precharge 5 operation	5
Perform current precharge 6 operation	6
Carry out voltage precharge	7

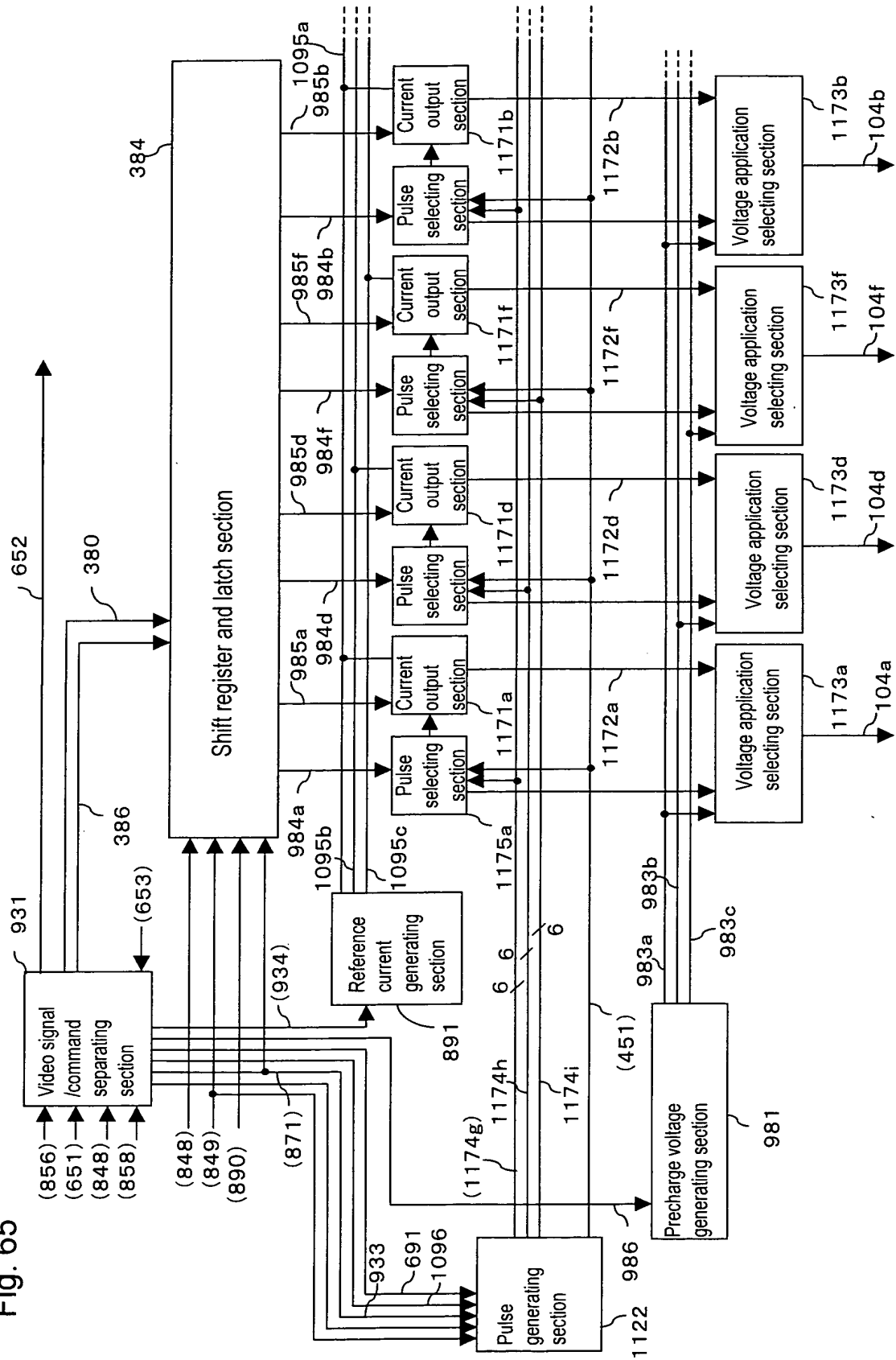
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Fig. 64



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Fig. 65



(653a)

(653b)

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Fig. 67

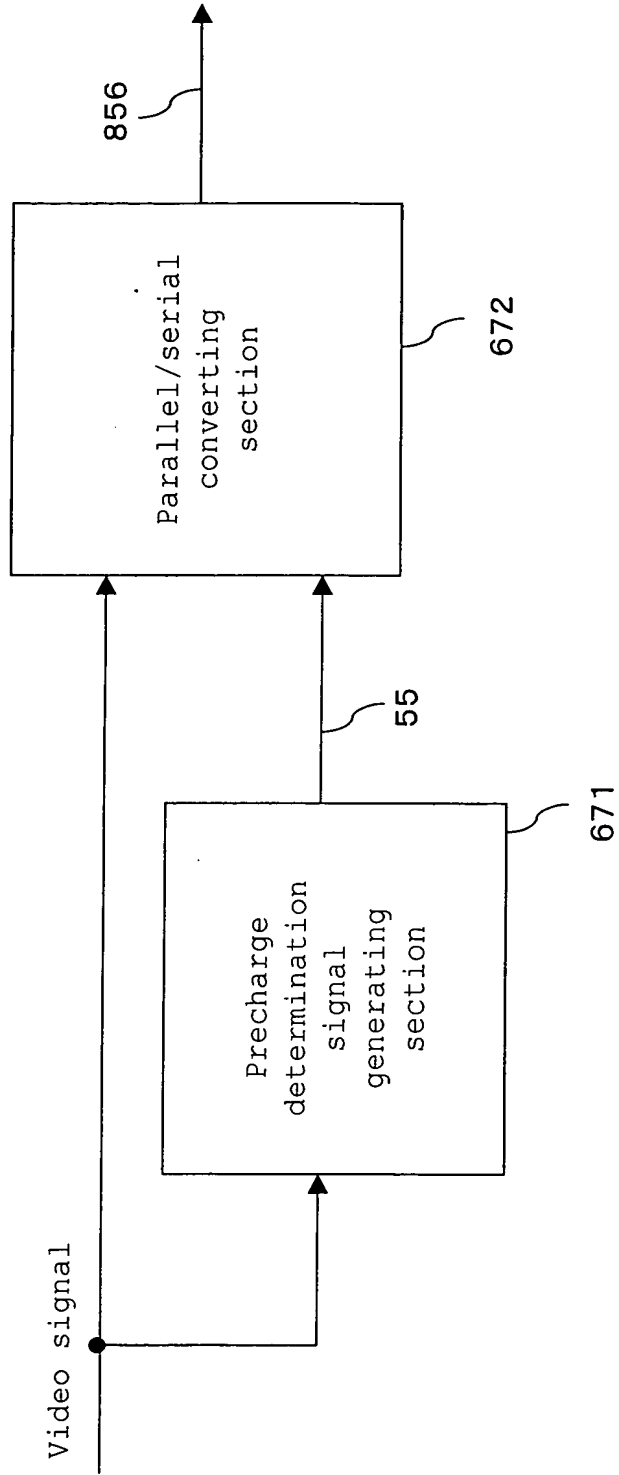


Fig. 68

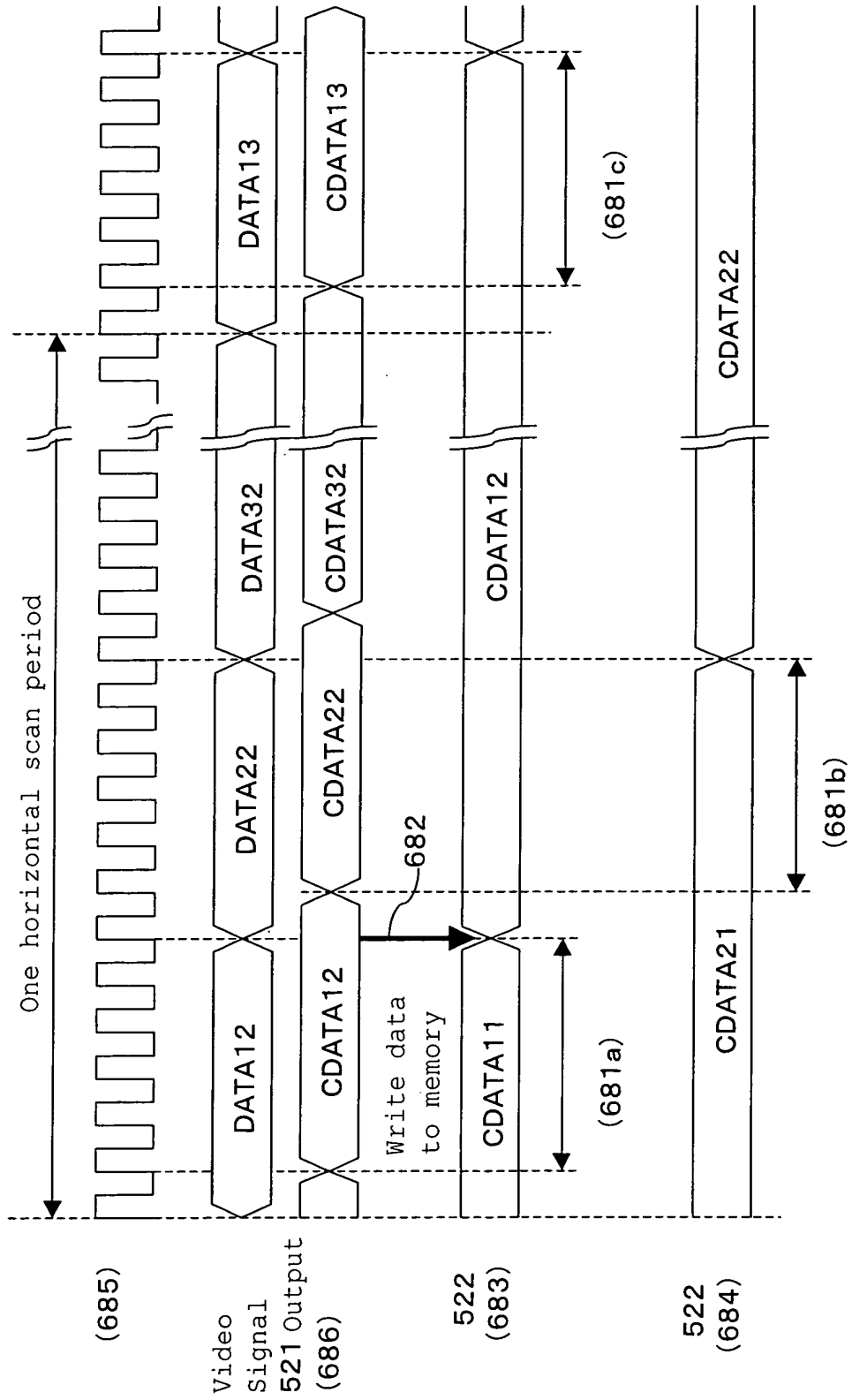
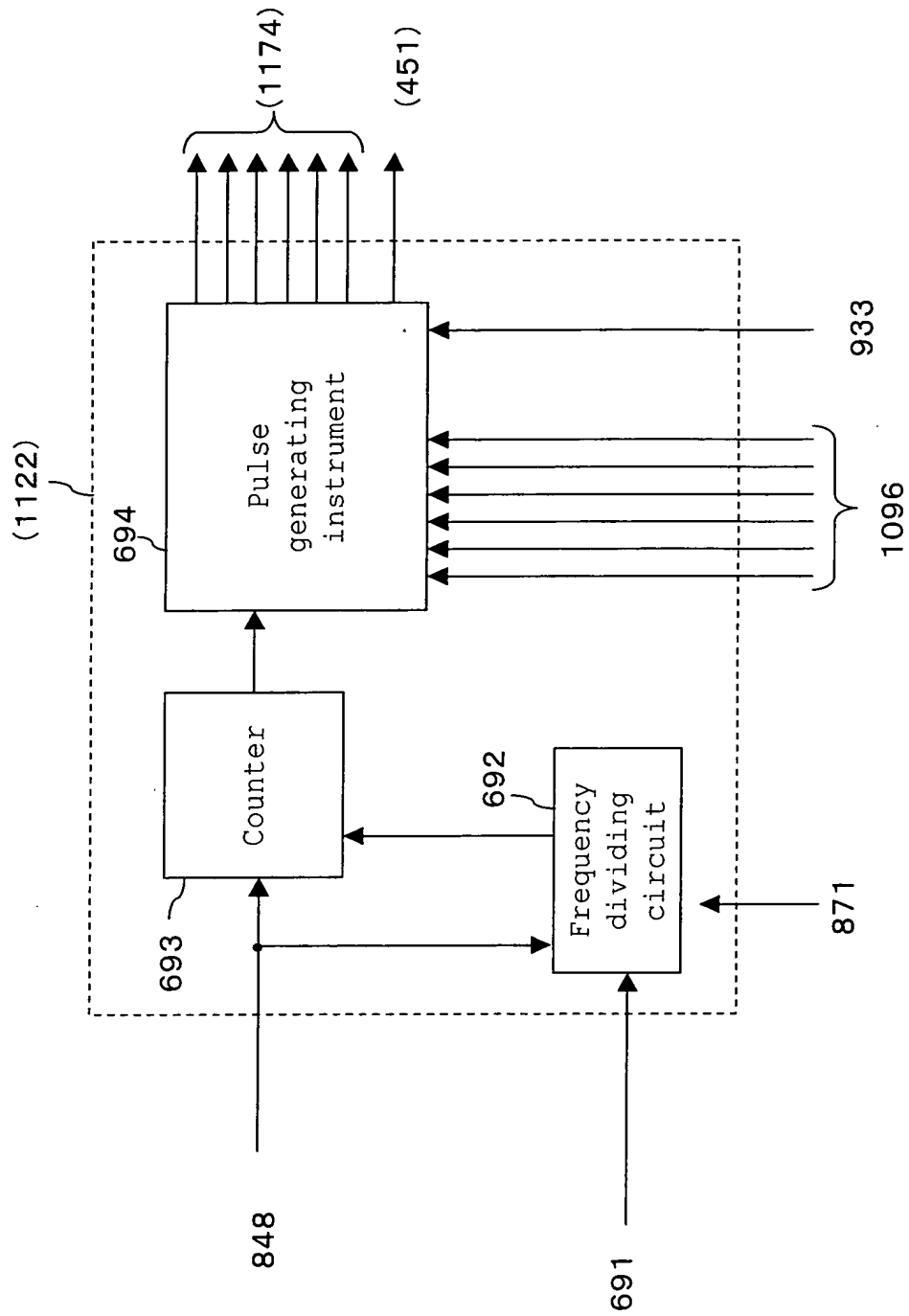


Fig. 69



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Fig. 70

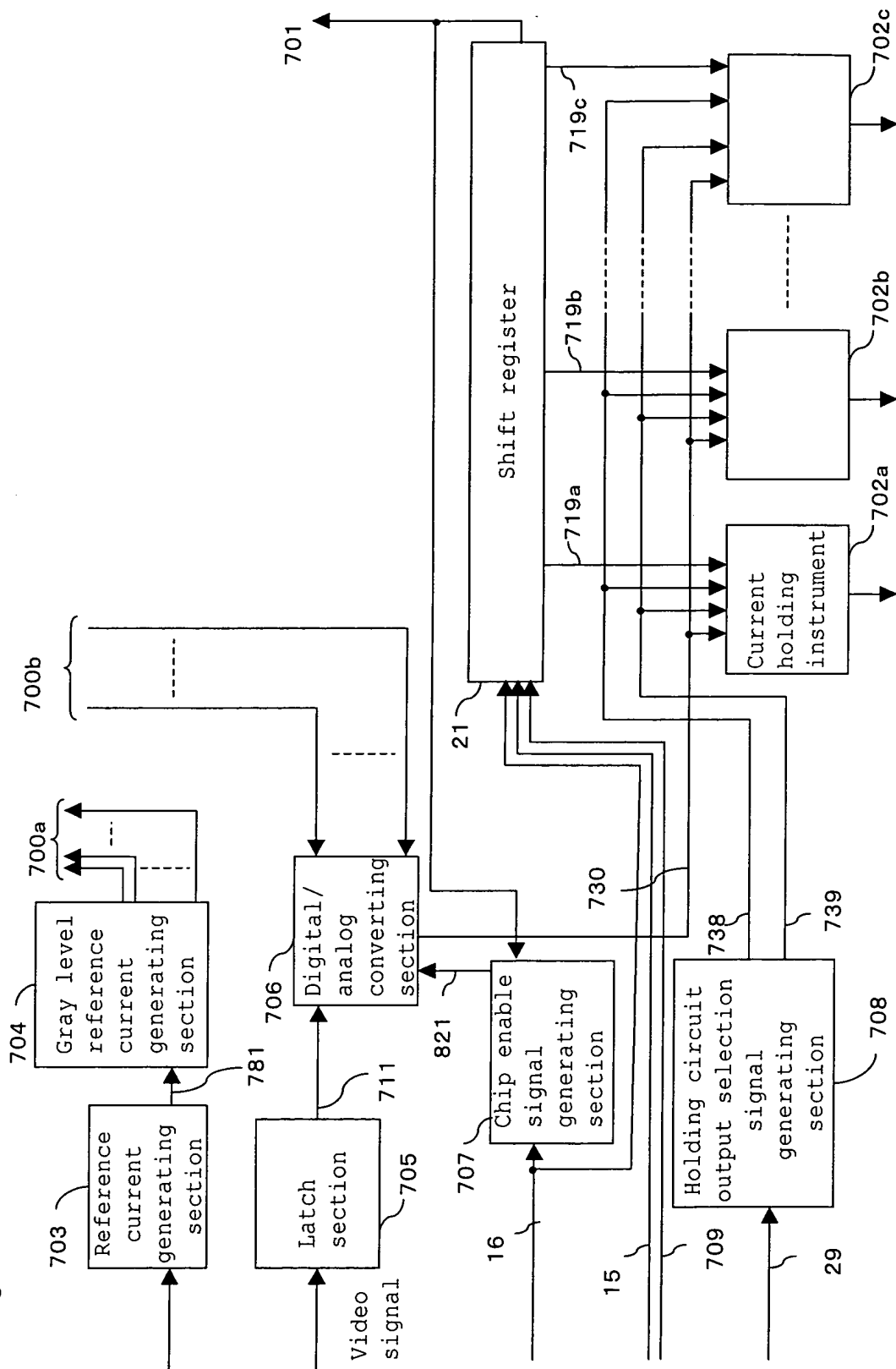
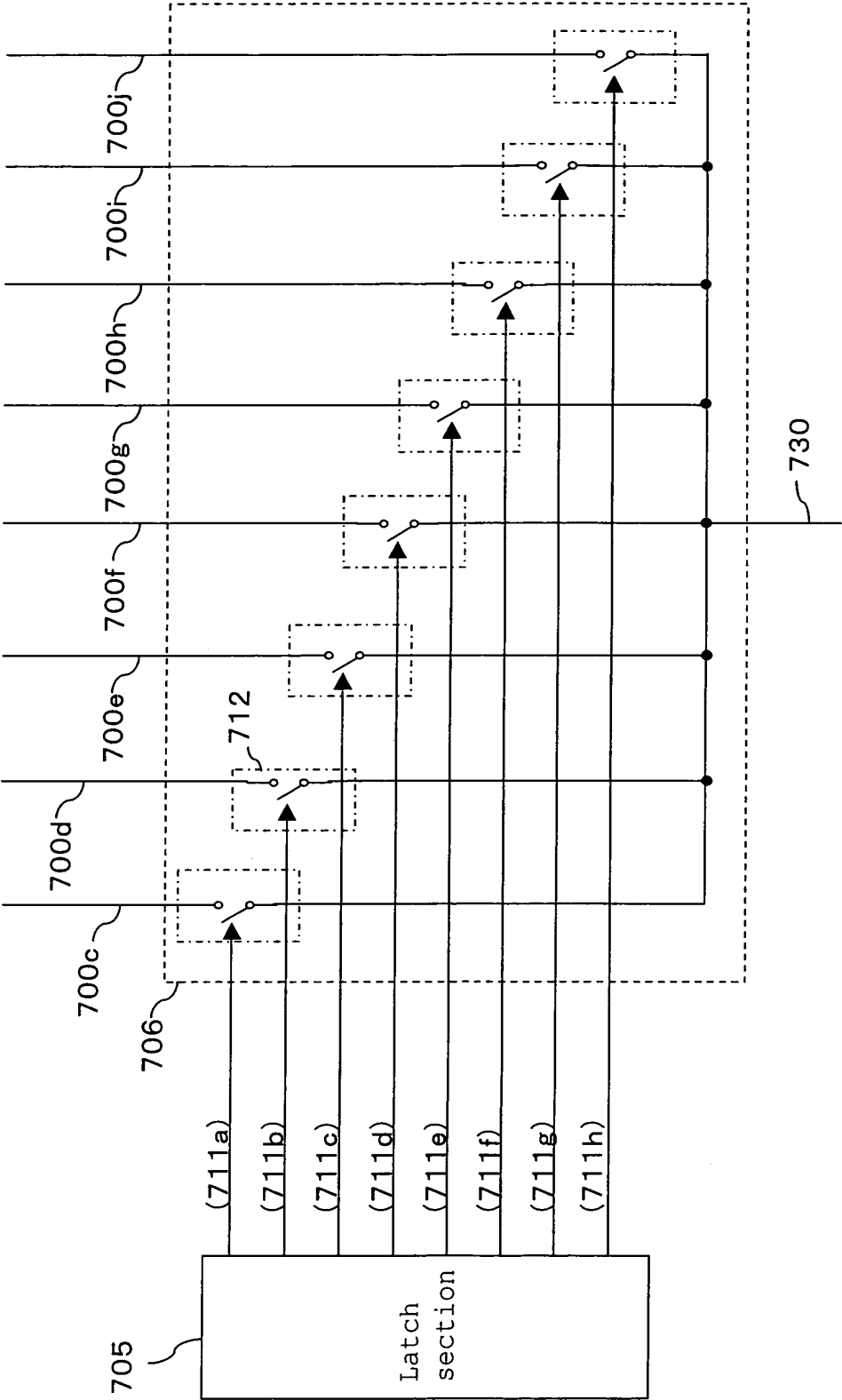
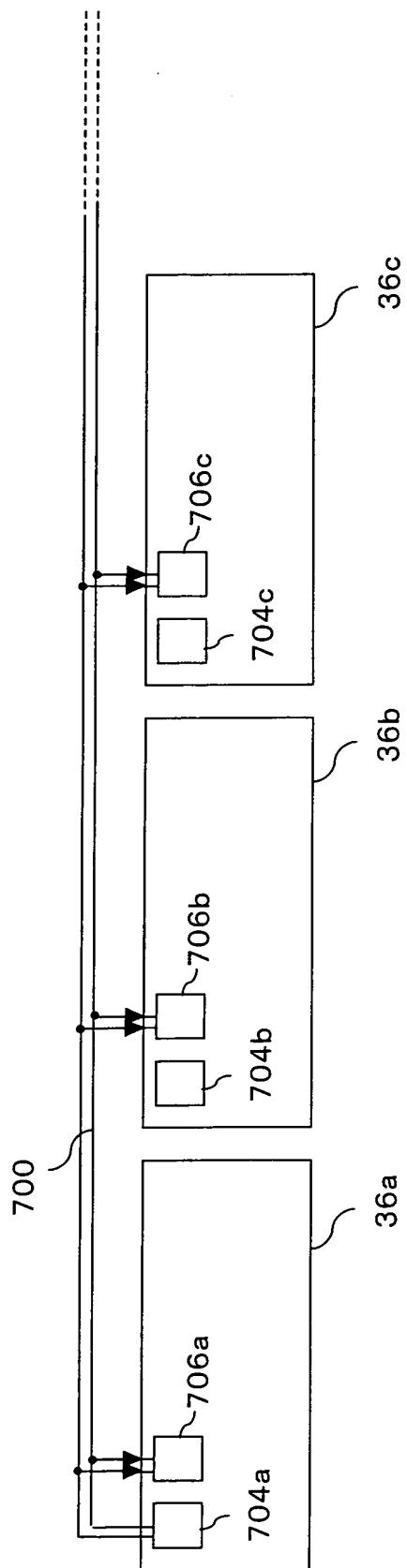


Fig. 71

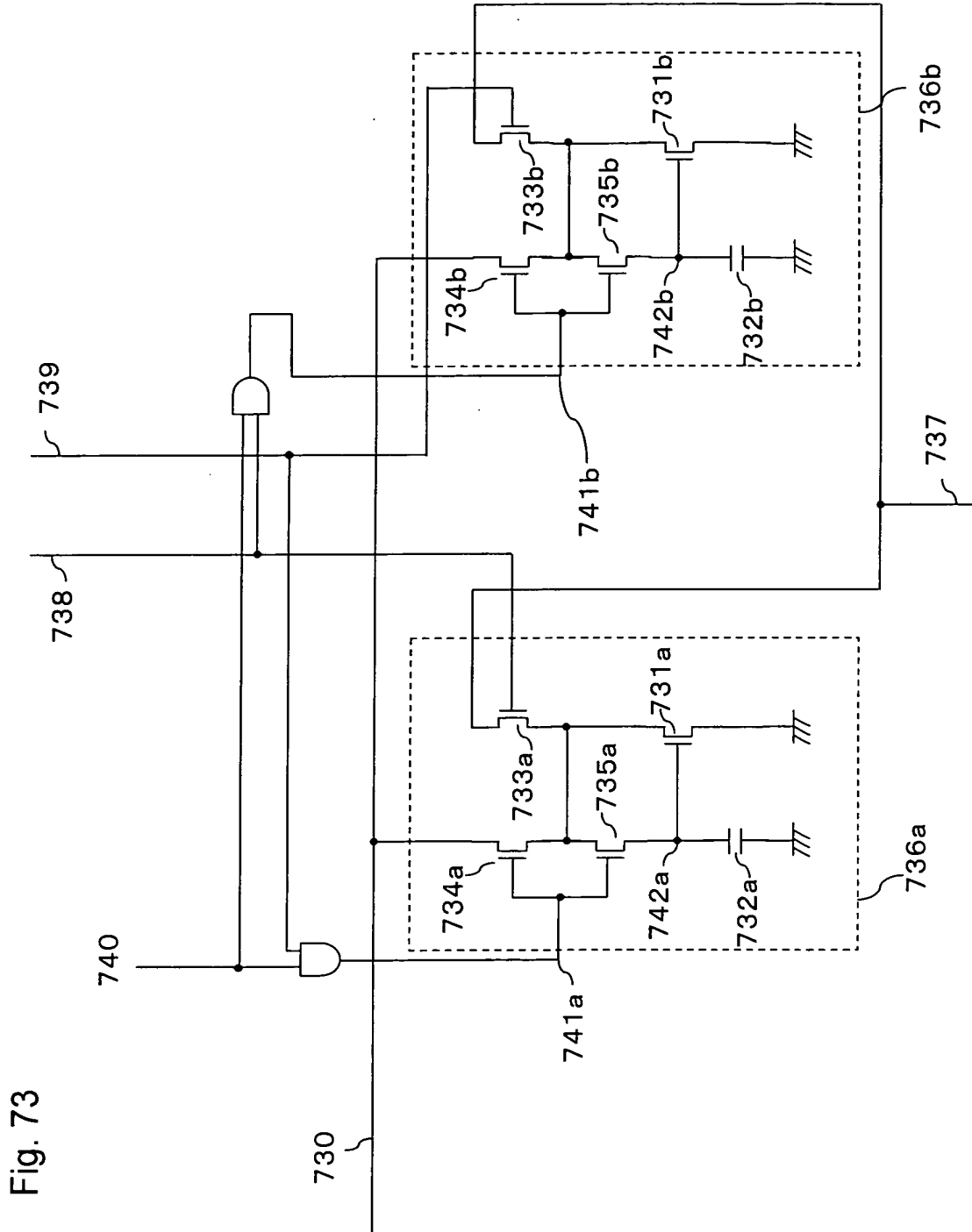


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Fig. 72

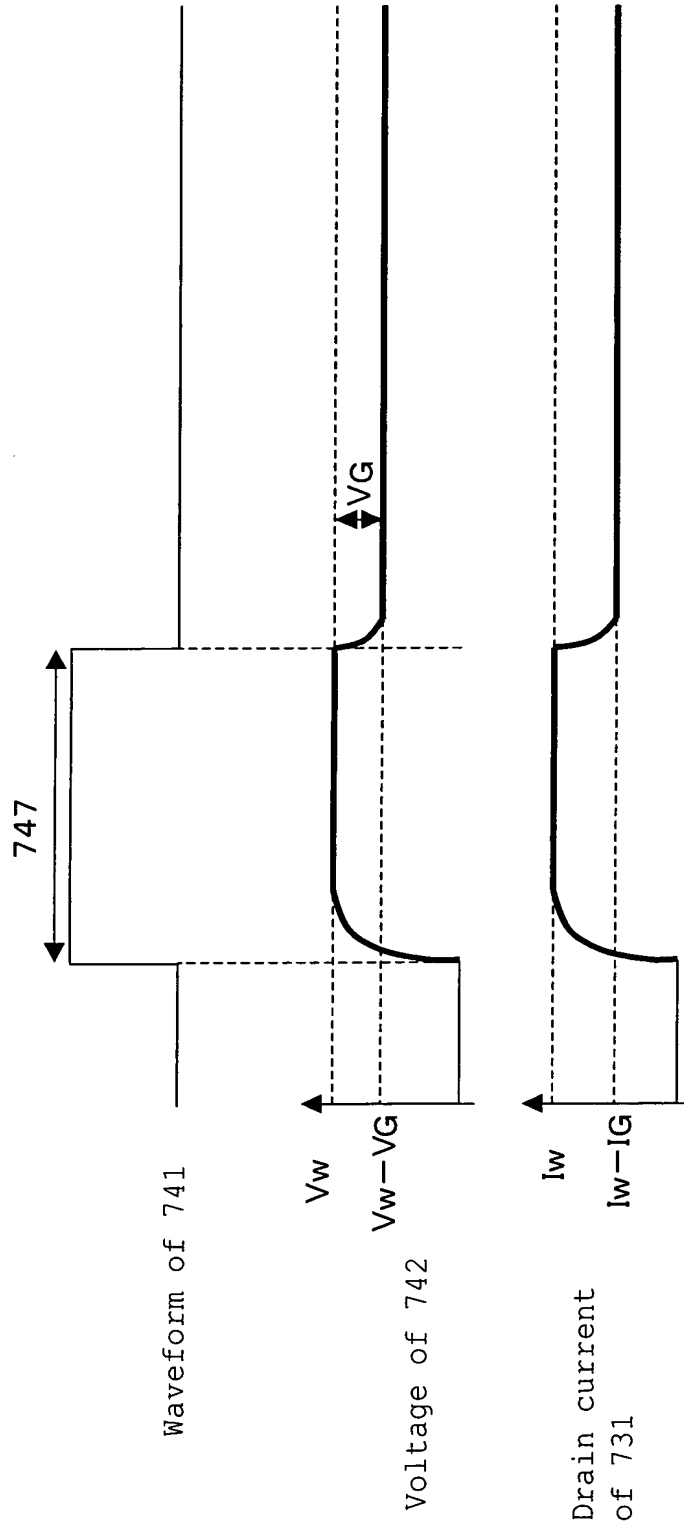


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Fig. 74



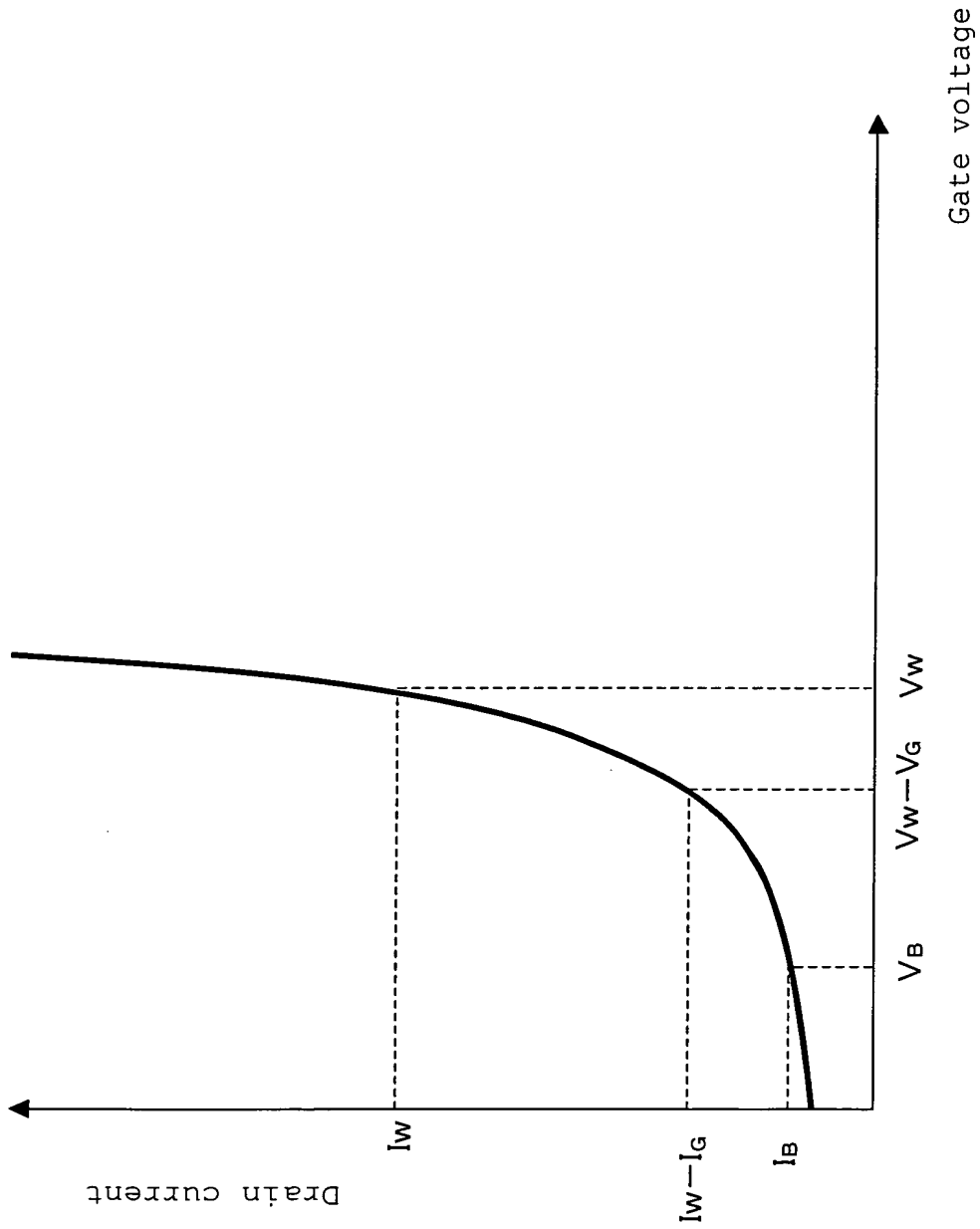
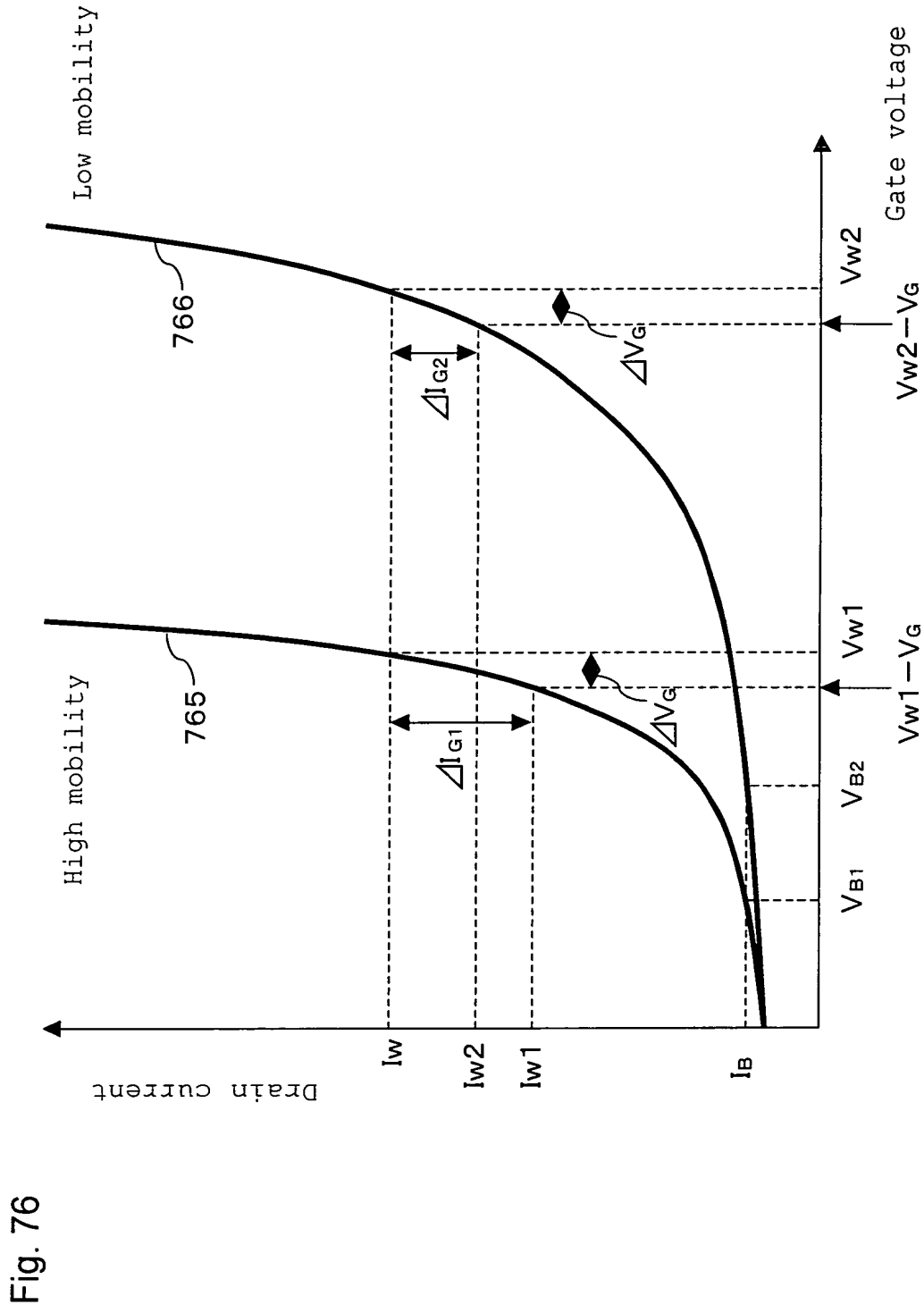
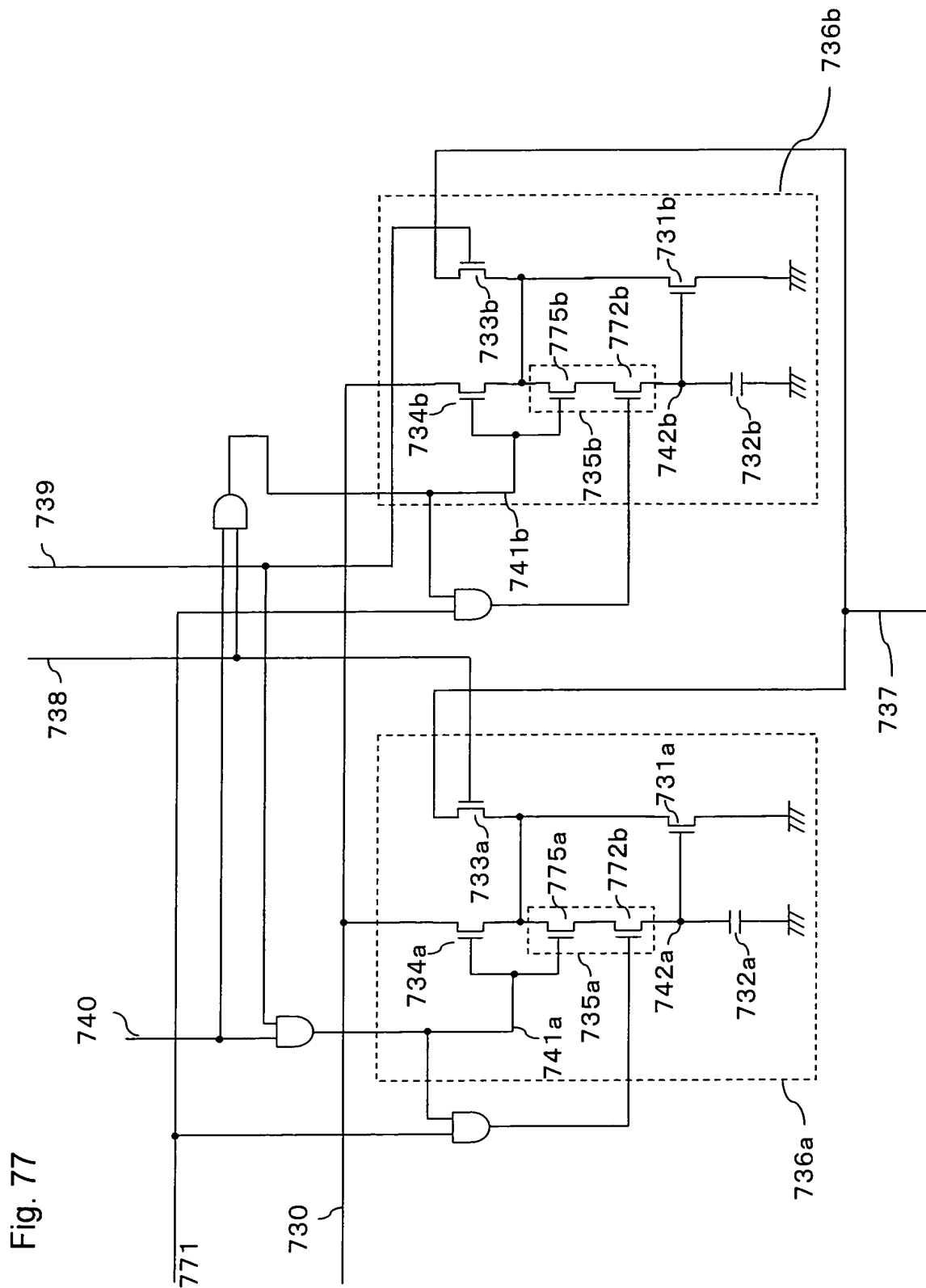


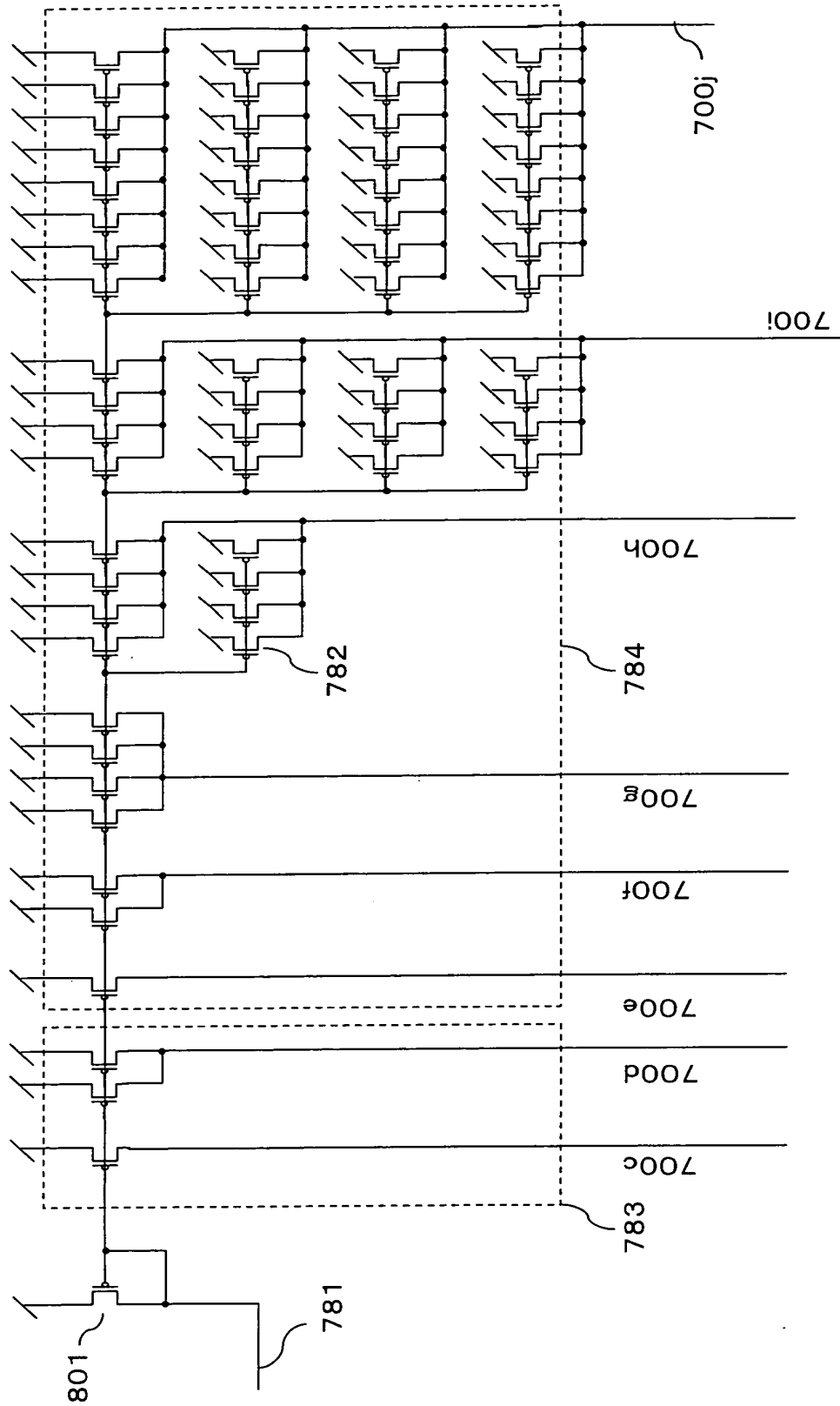
Fig. 75





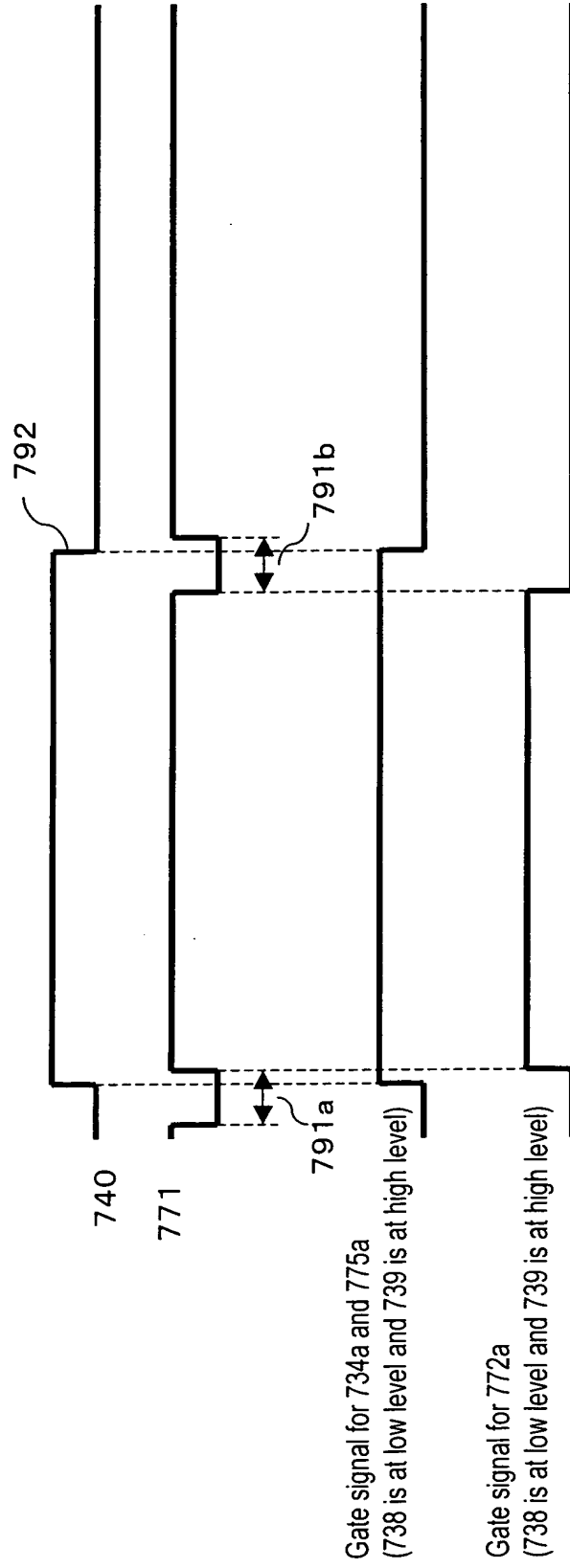
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Fig. 78

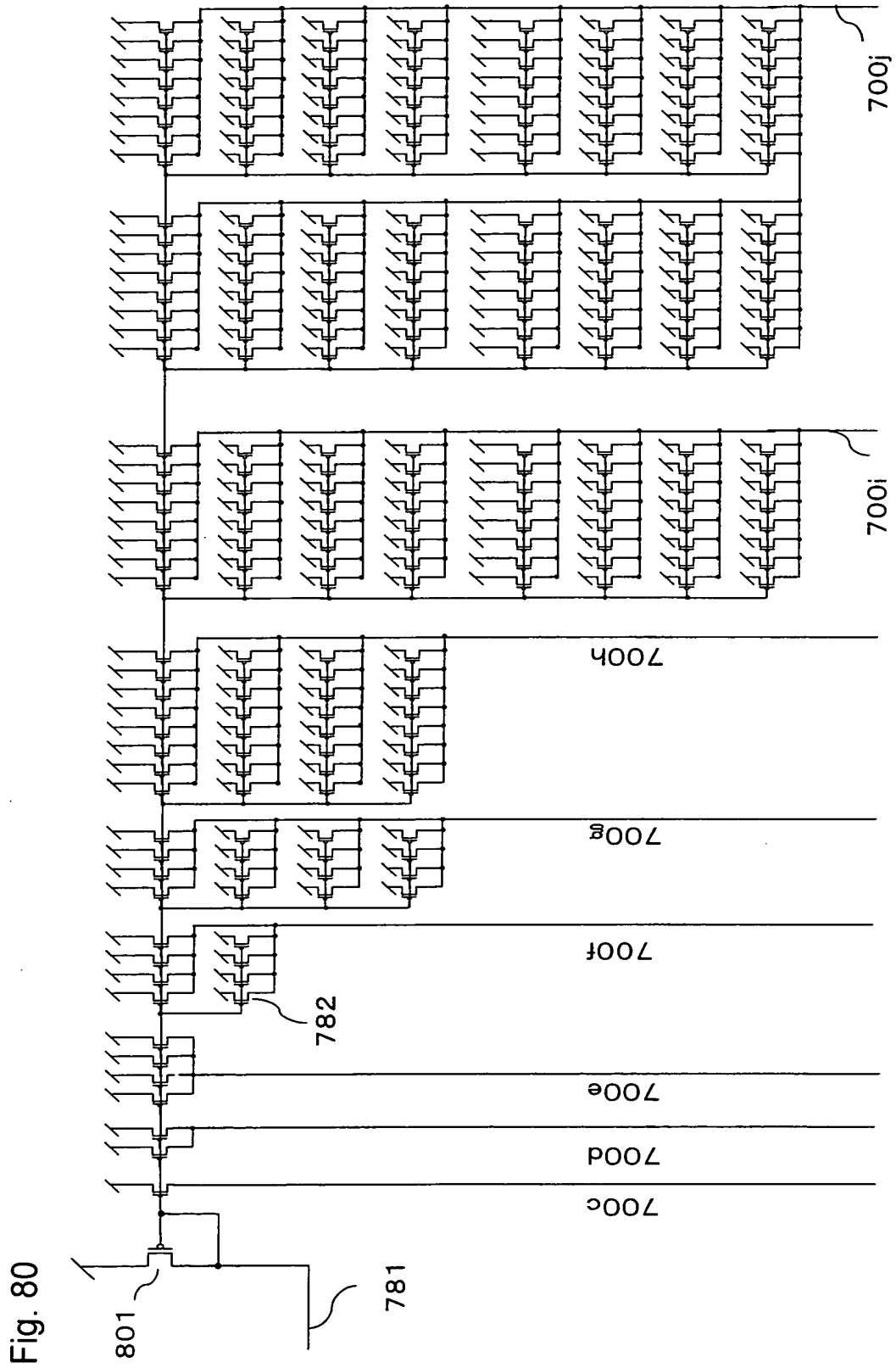


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Fig. 79

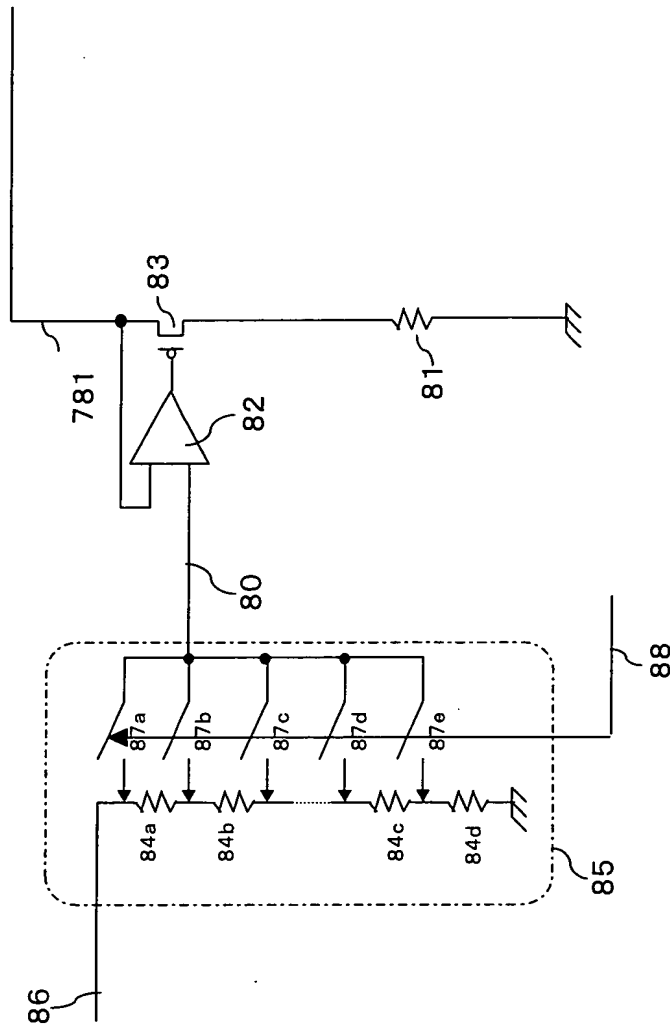


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Fig. 81



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Fig. 82

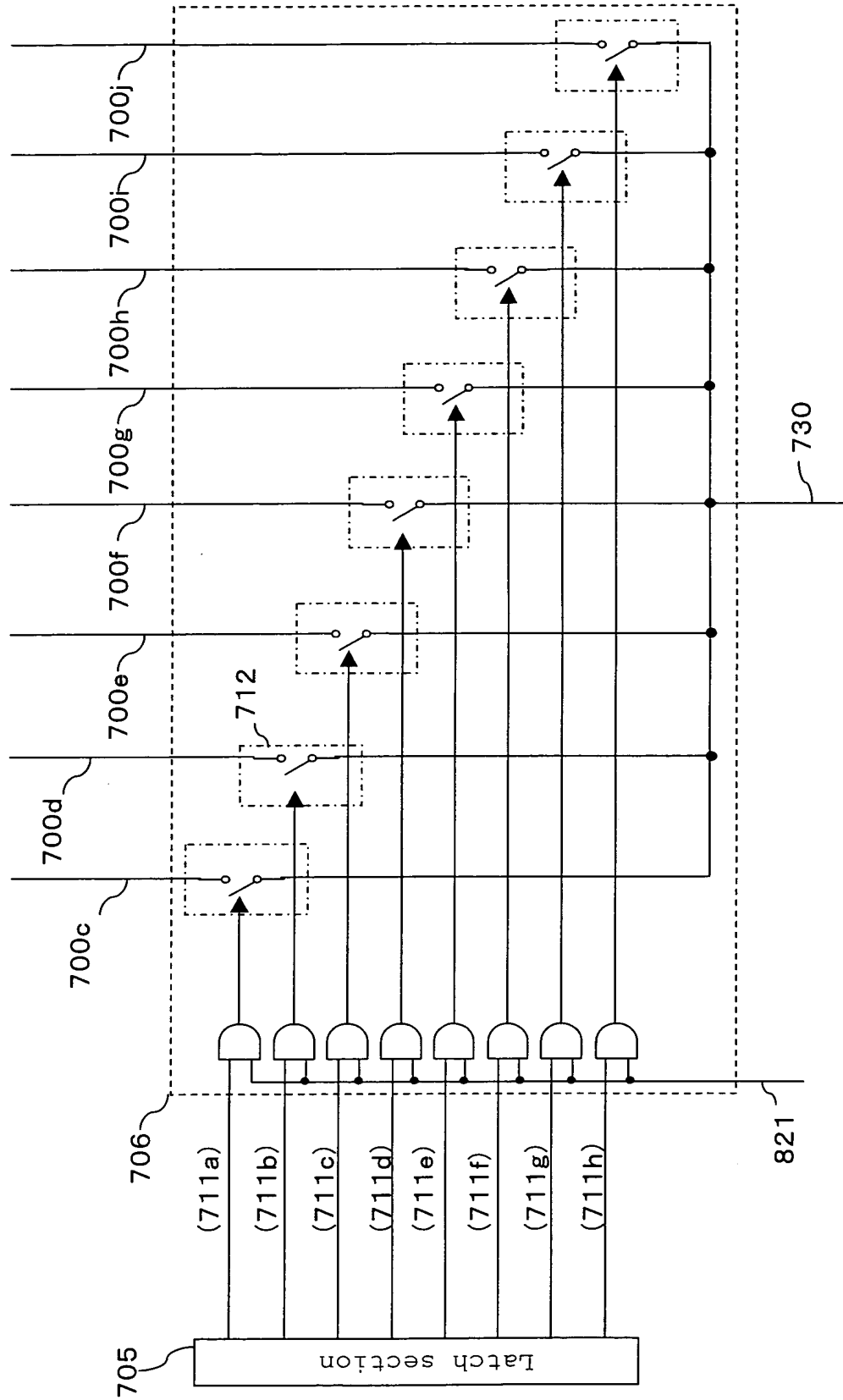
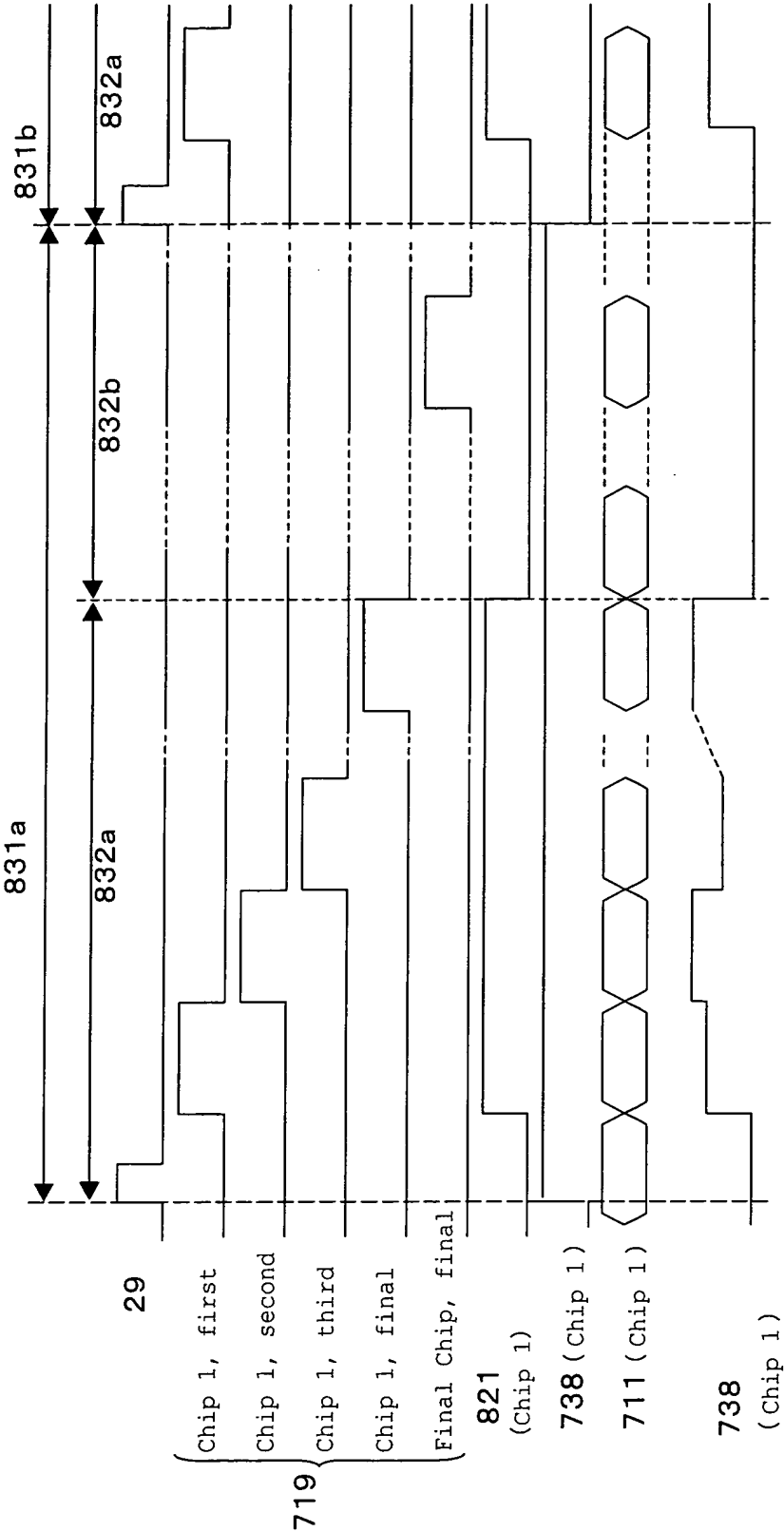
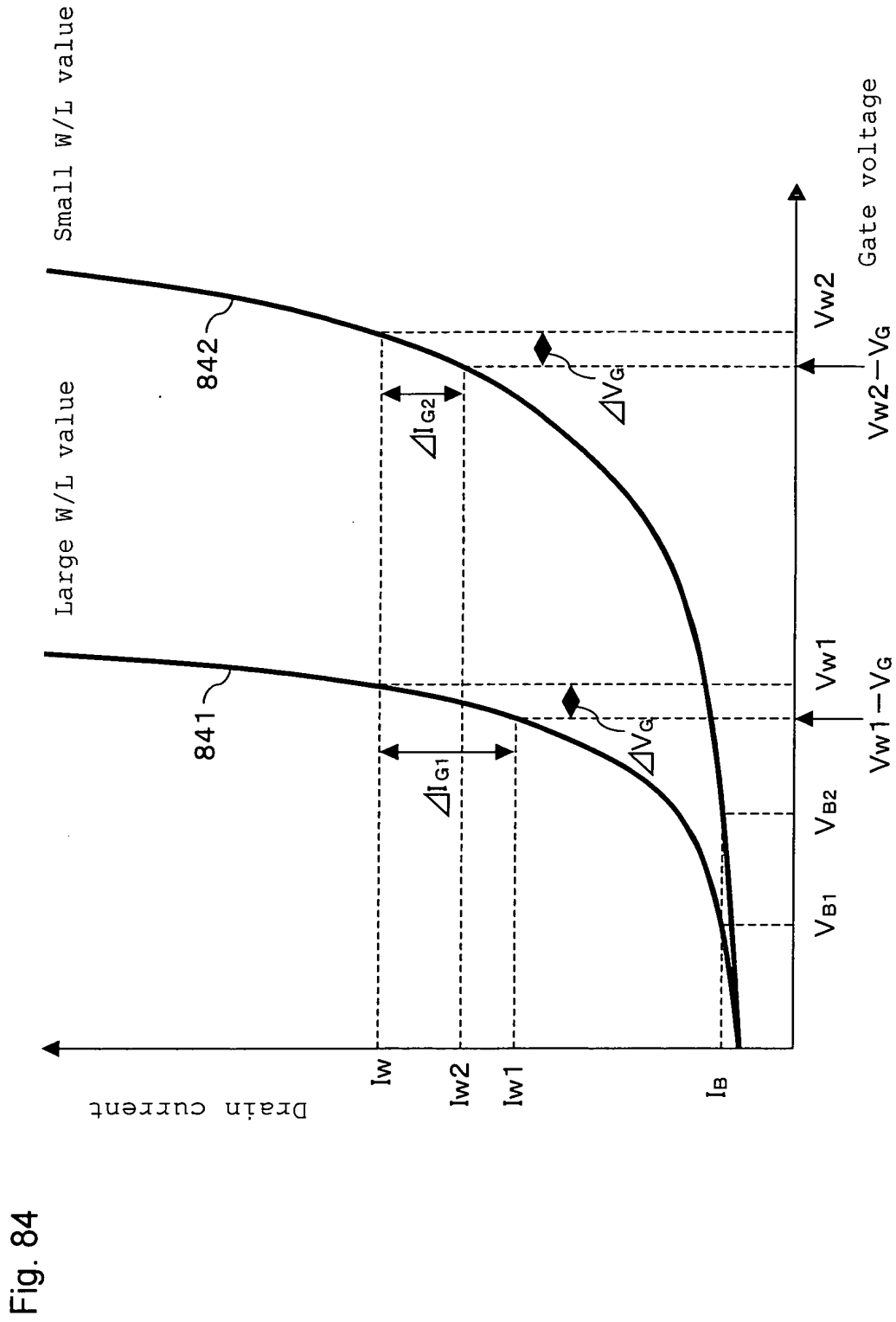


Fig. 83





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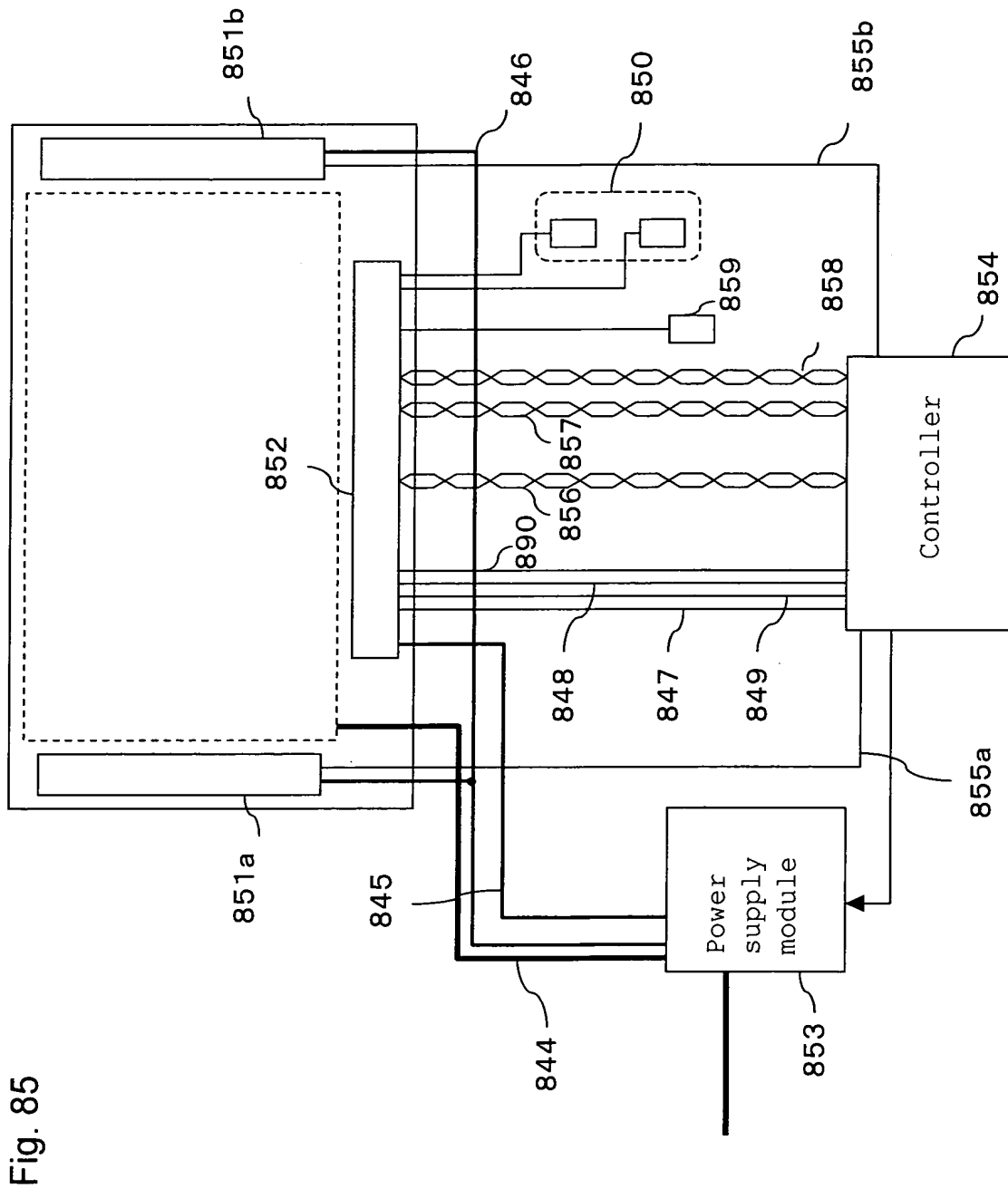


Fig. 86

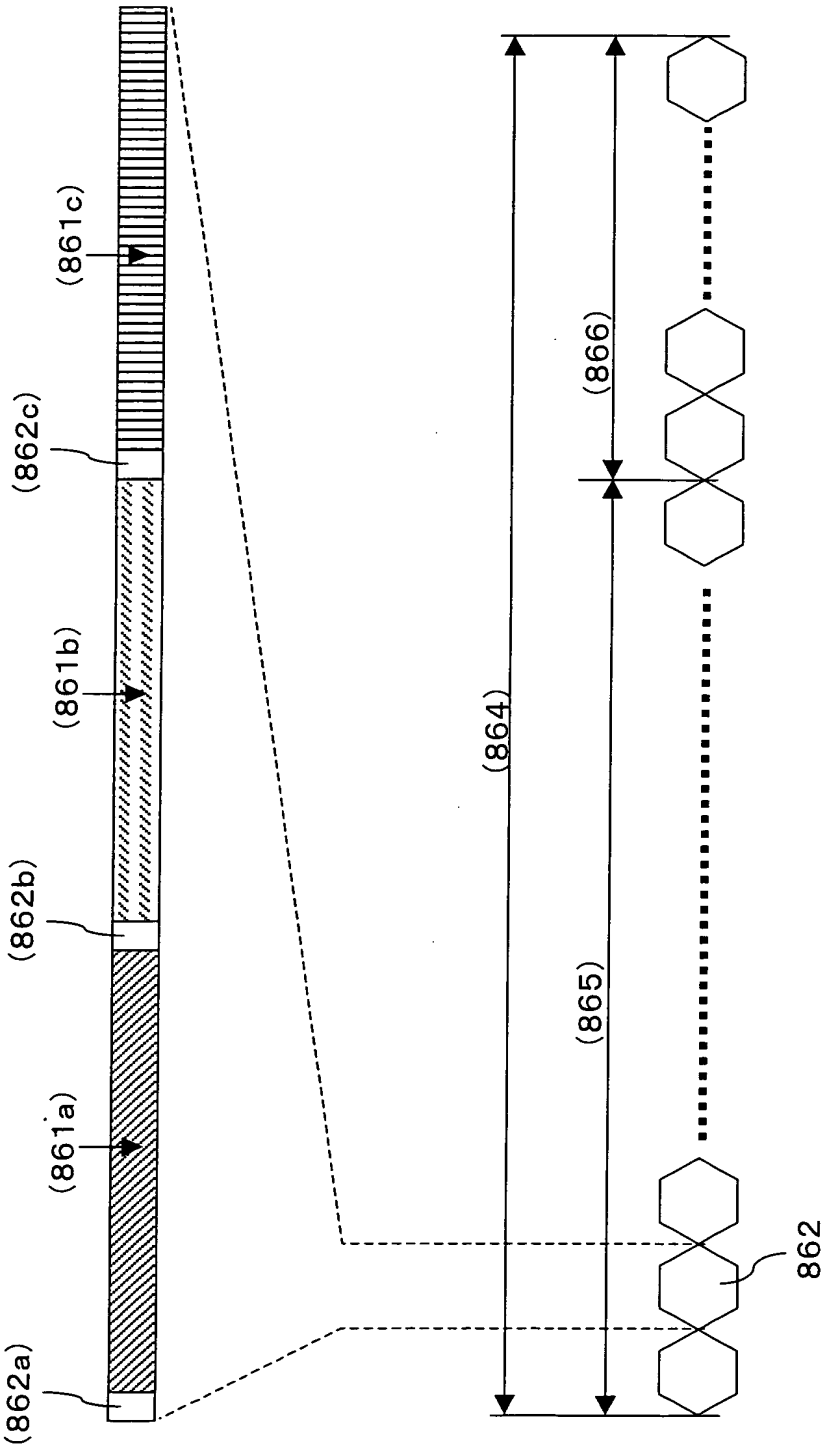


Fig. 87

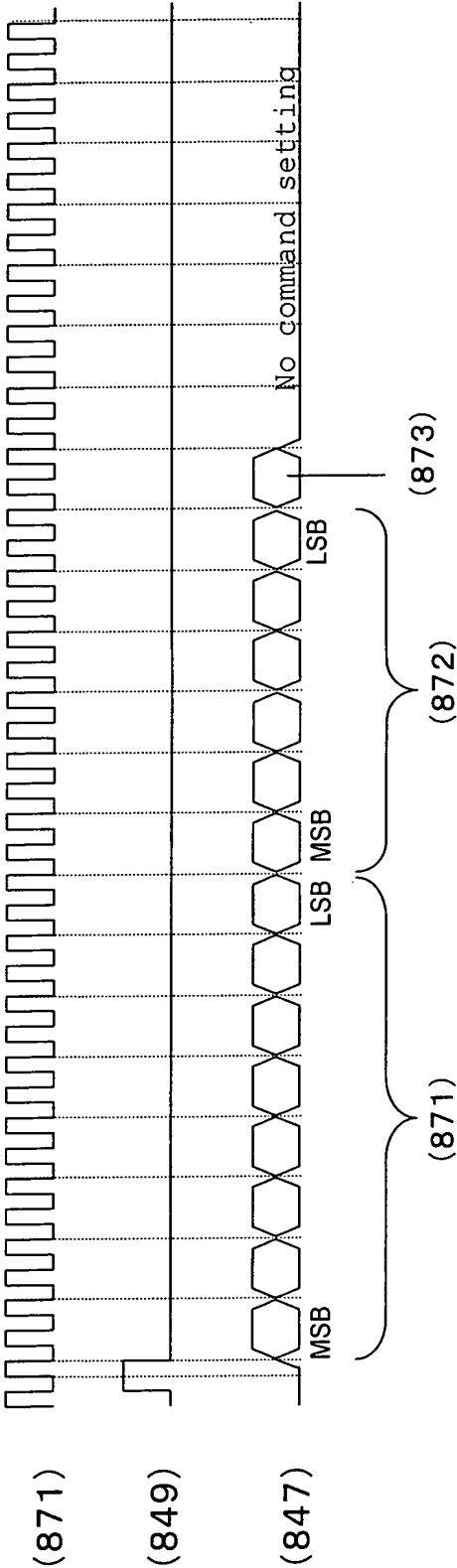


Fig. 88

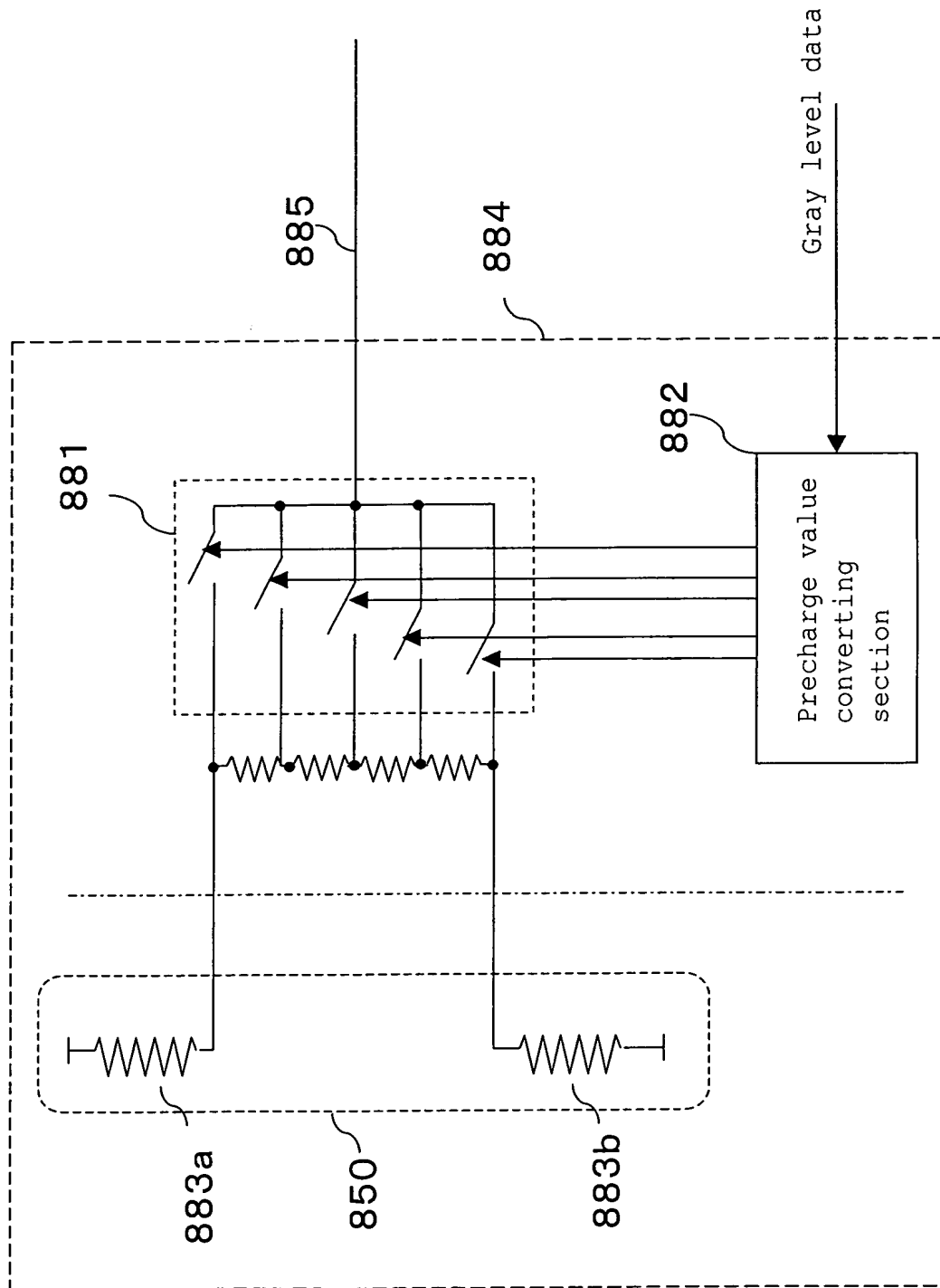
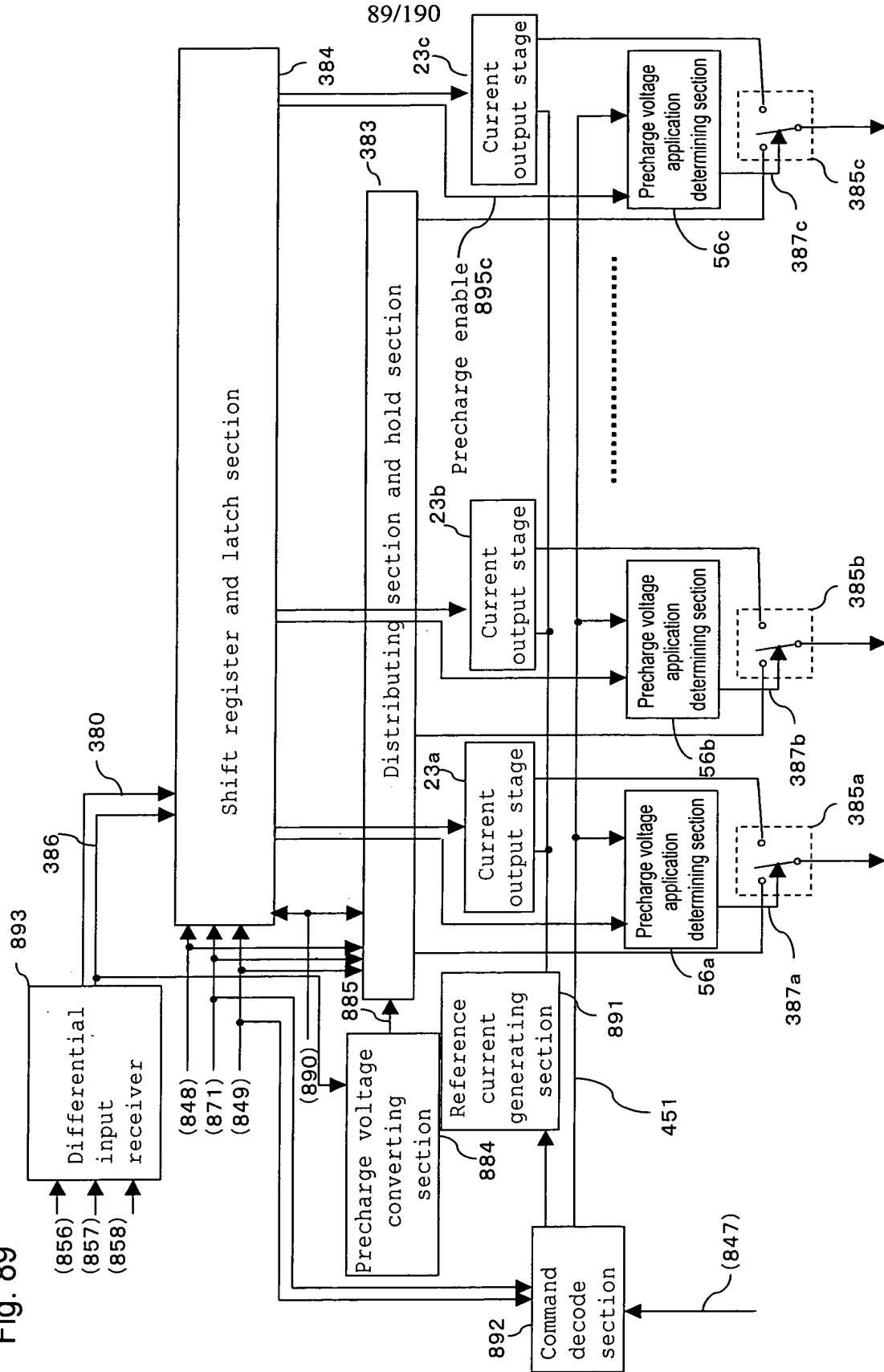


Fig. 89



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Fig. 90

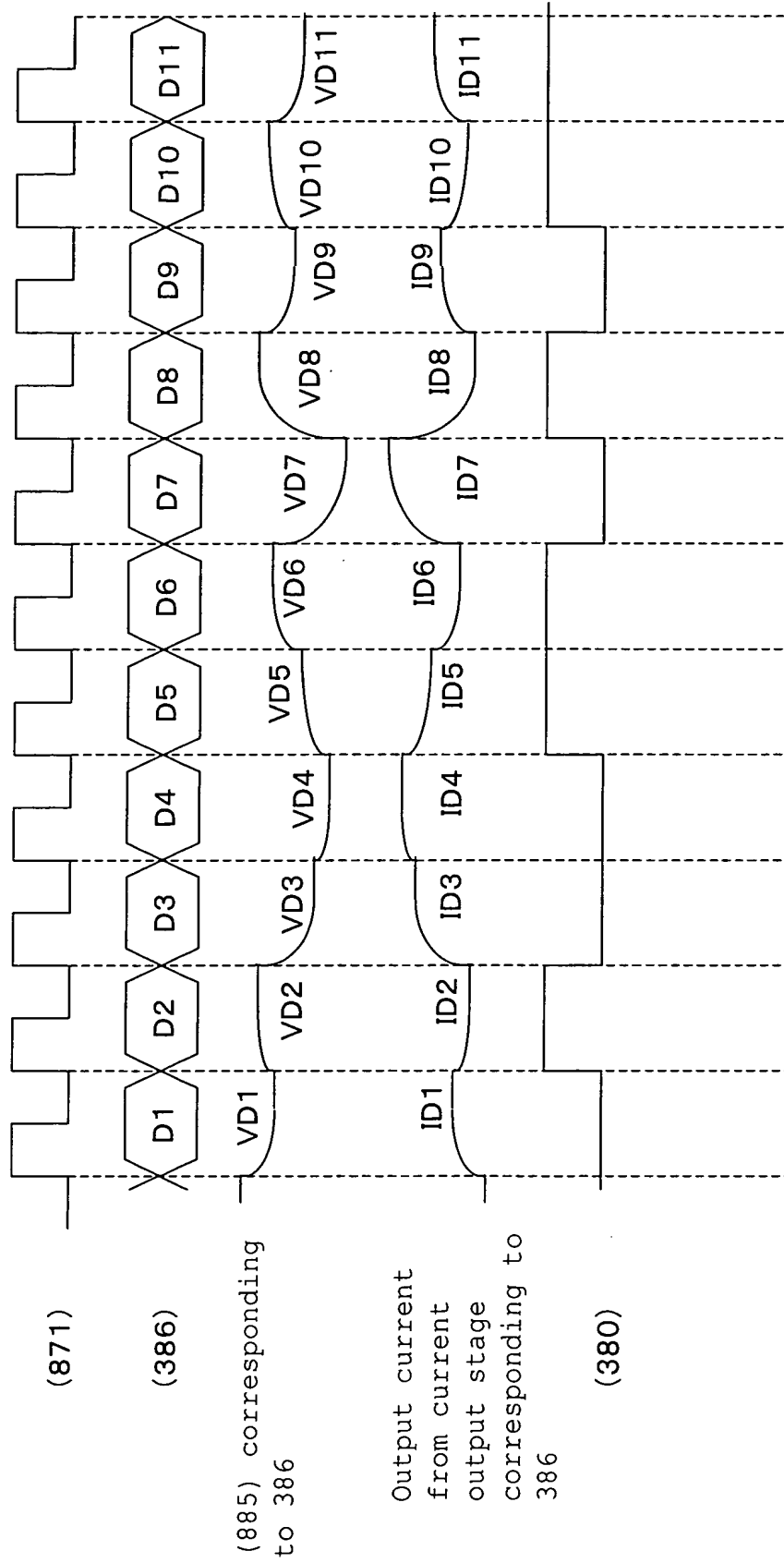


Fig. 91 (a)

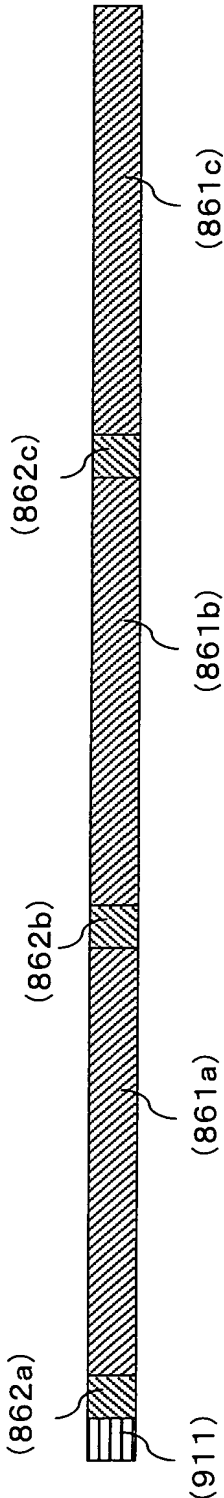


Fig. 91 (b)

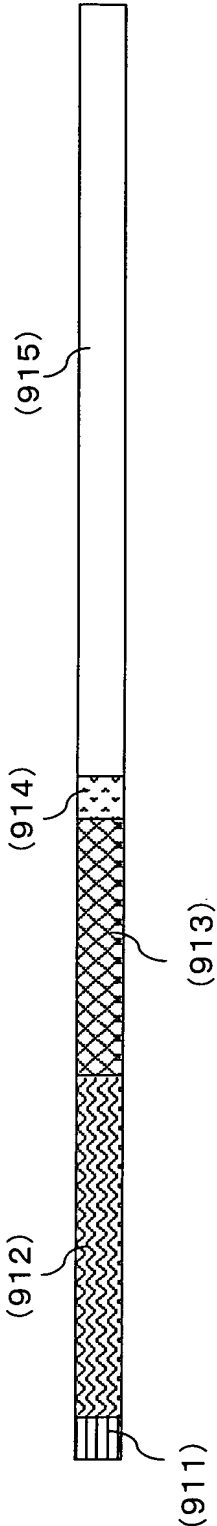
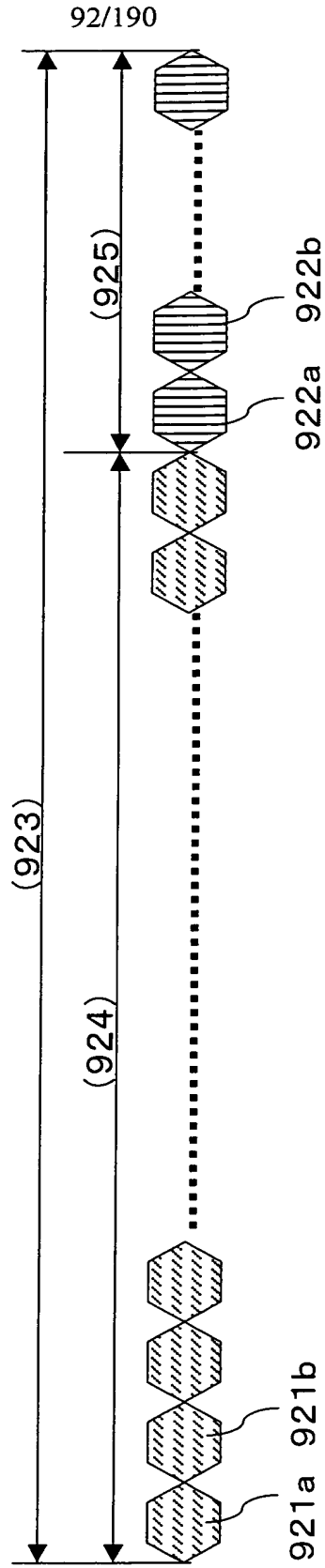
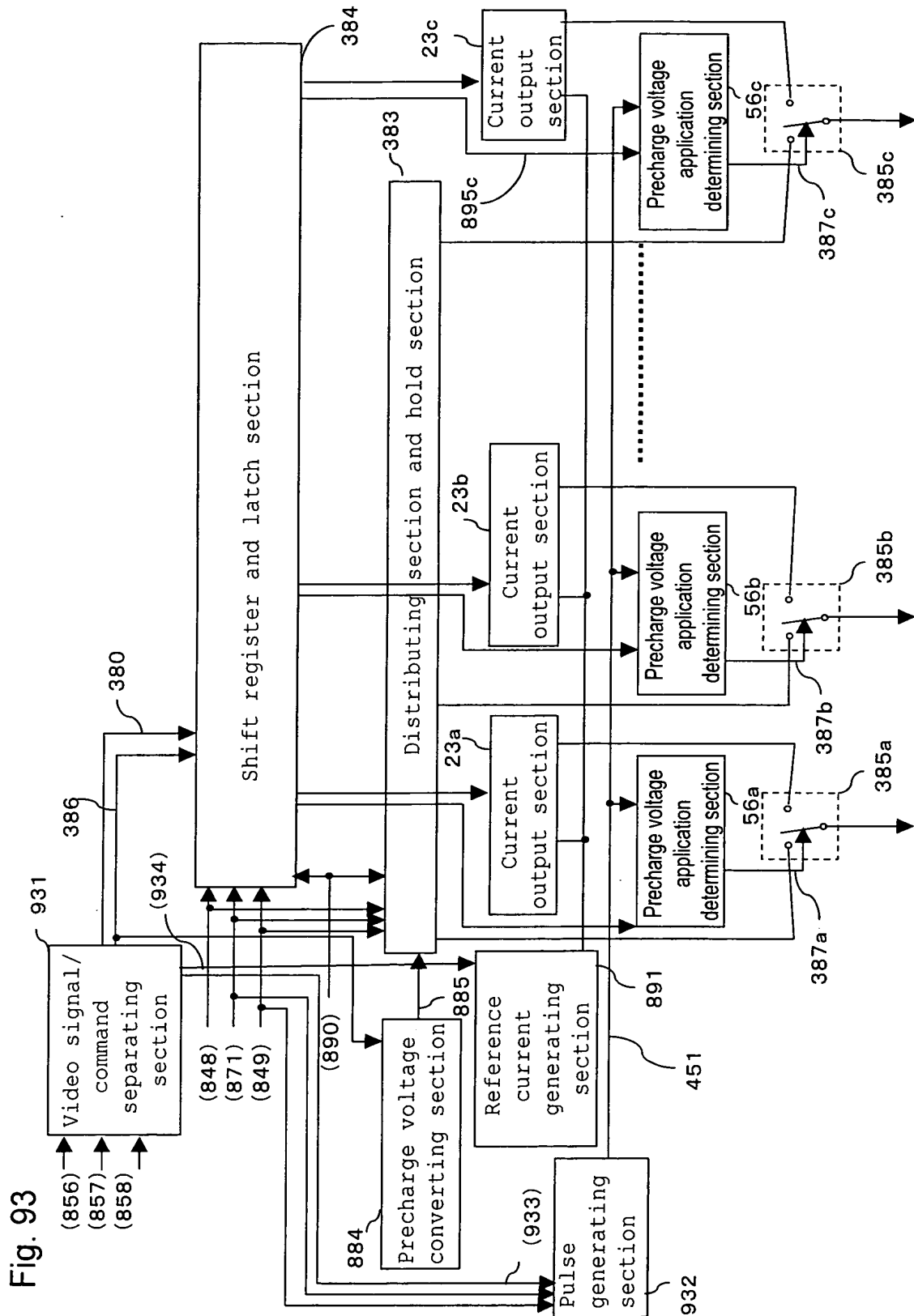


Fig. 92



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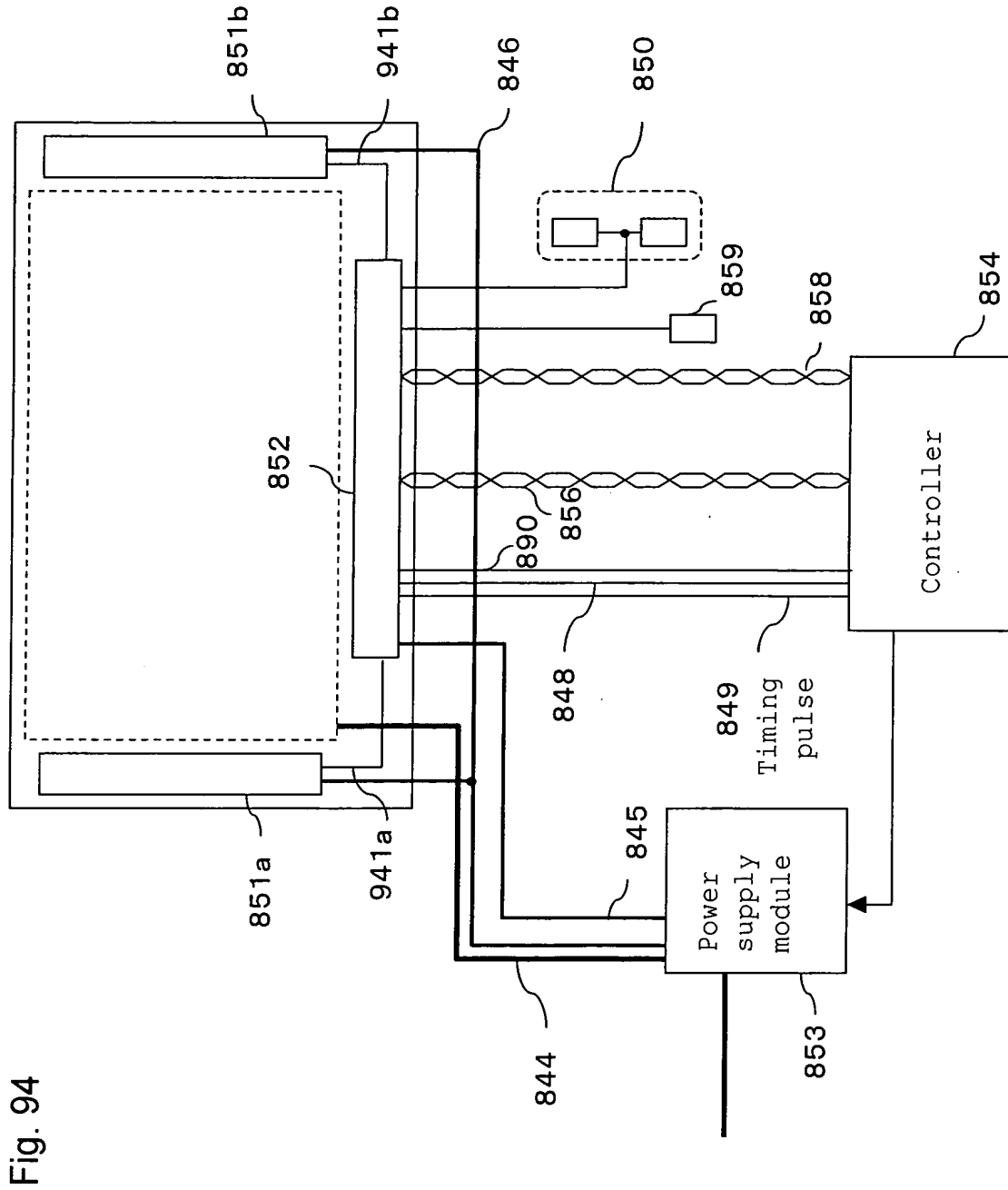


Fig. 95 (a)

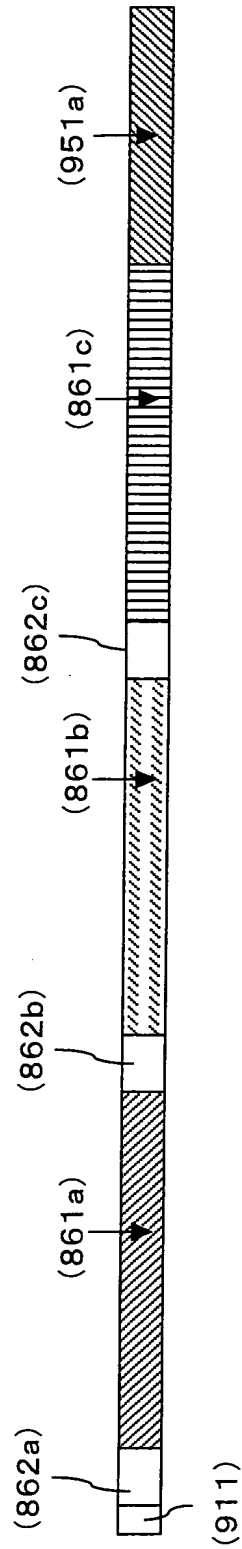


Fig. 95 (b)

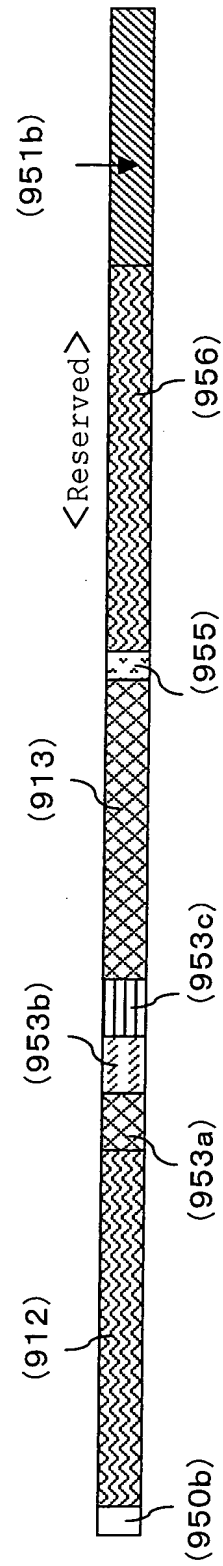
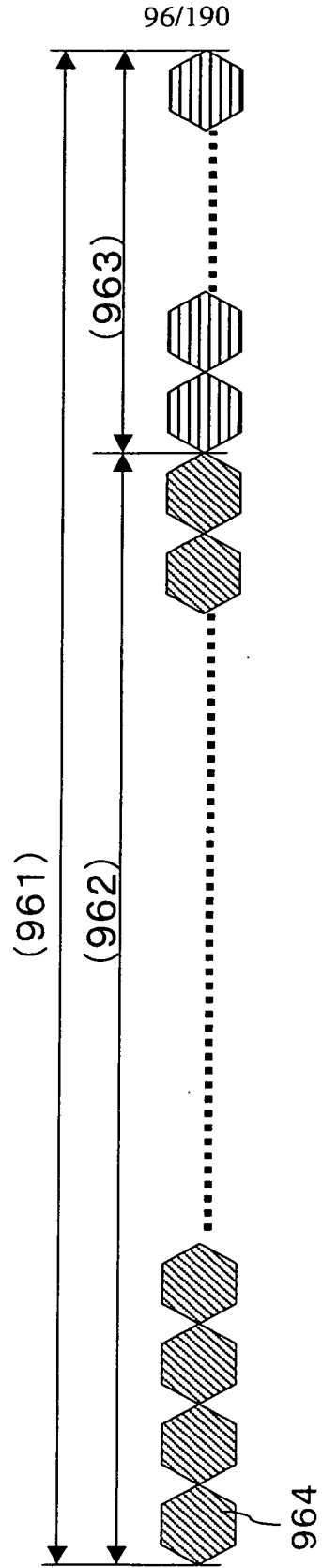


Fig. 96



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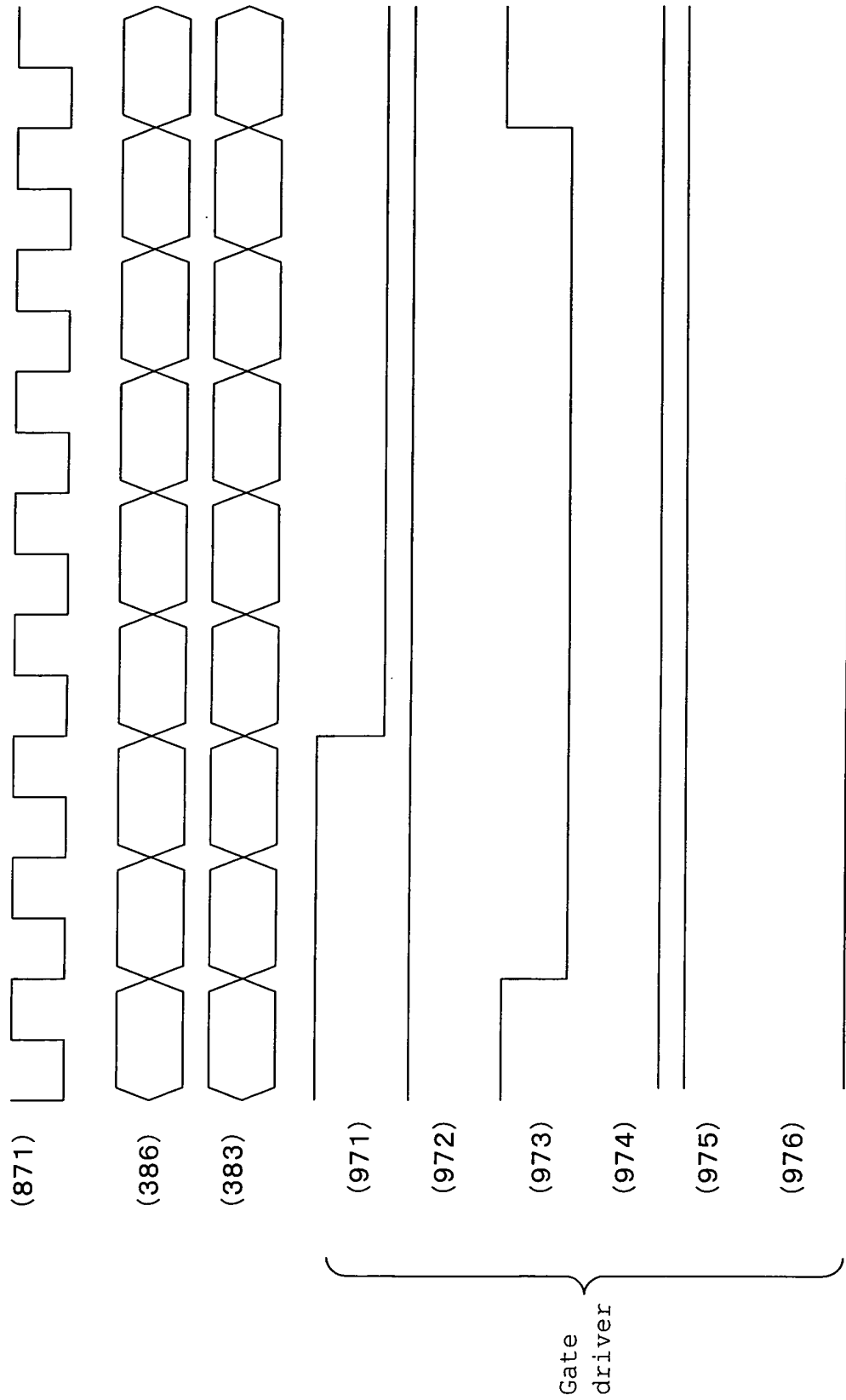
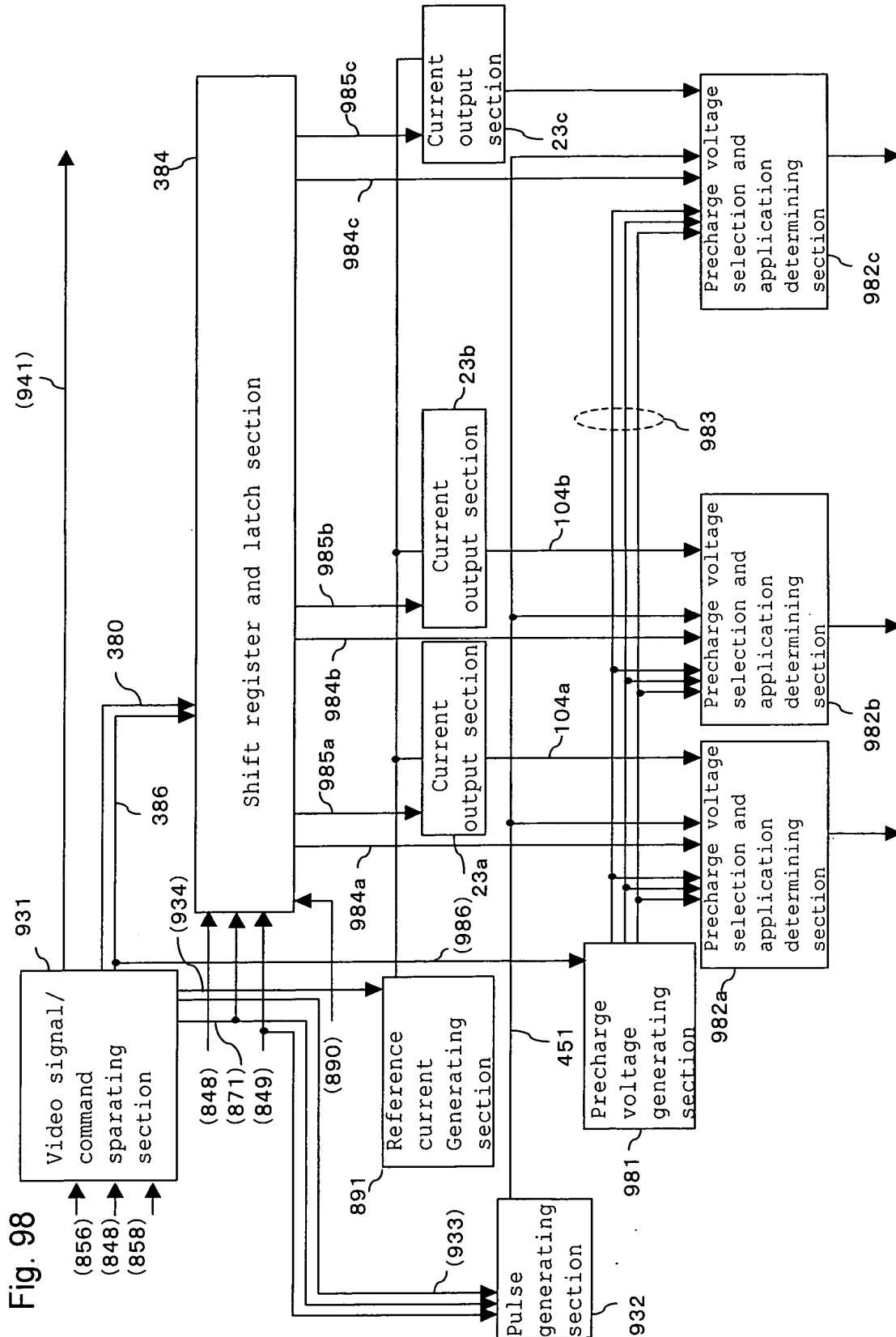


Fig. 97

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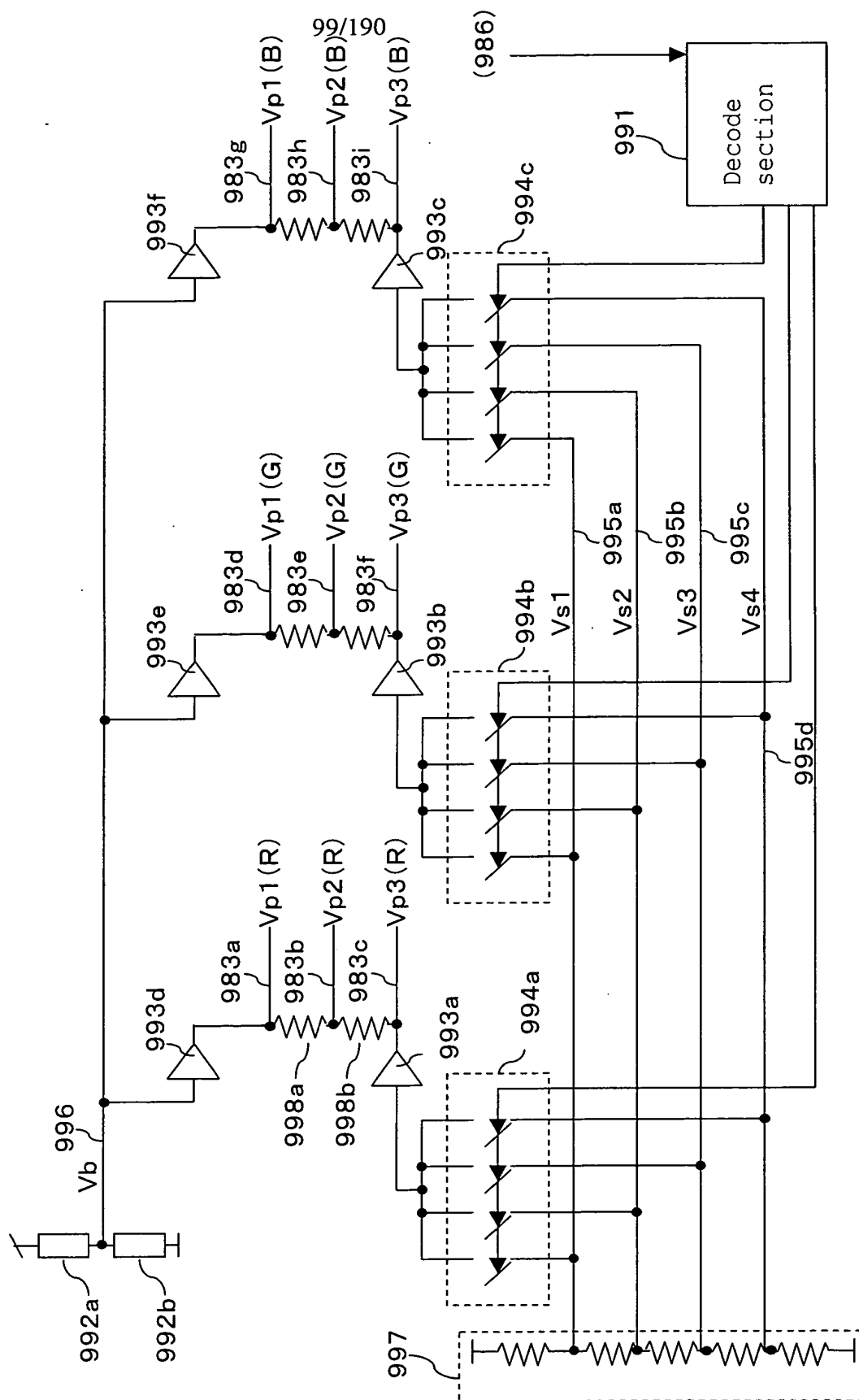
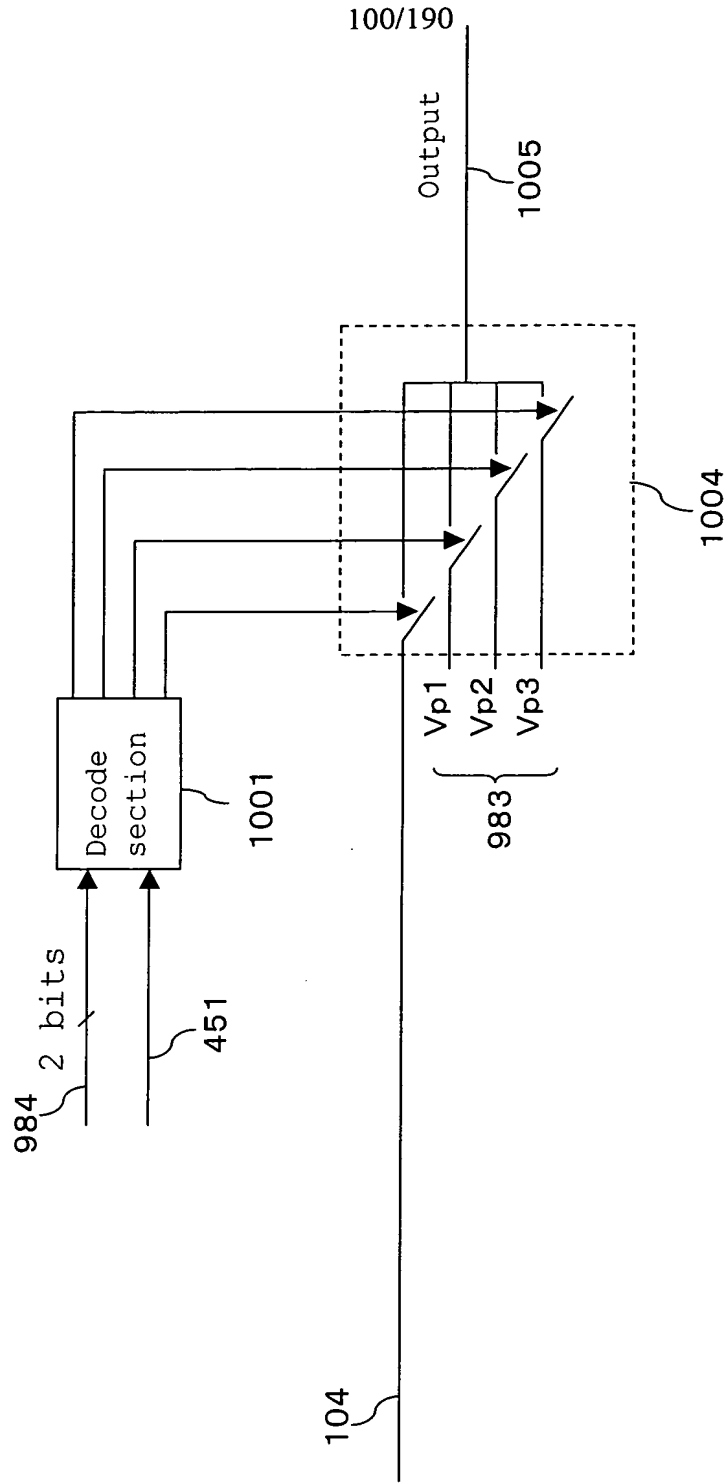


Fig. 100

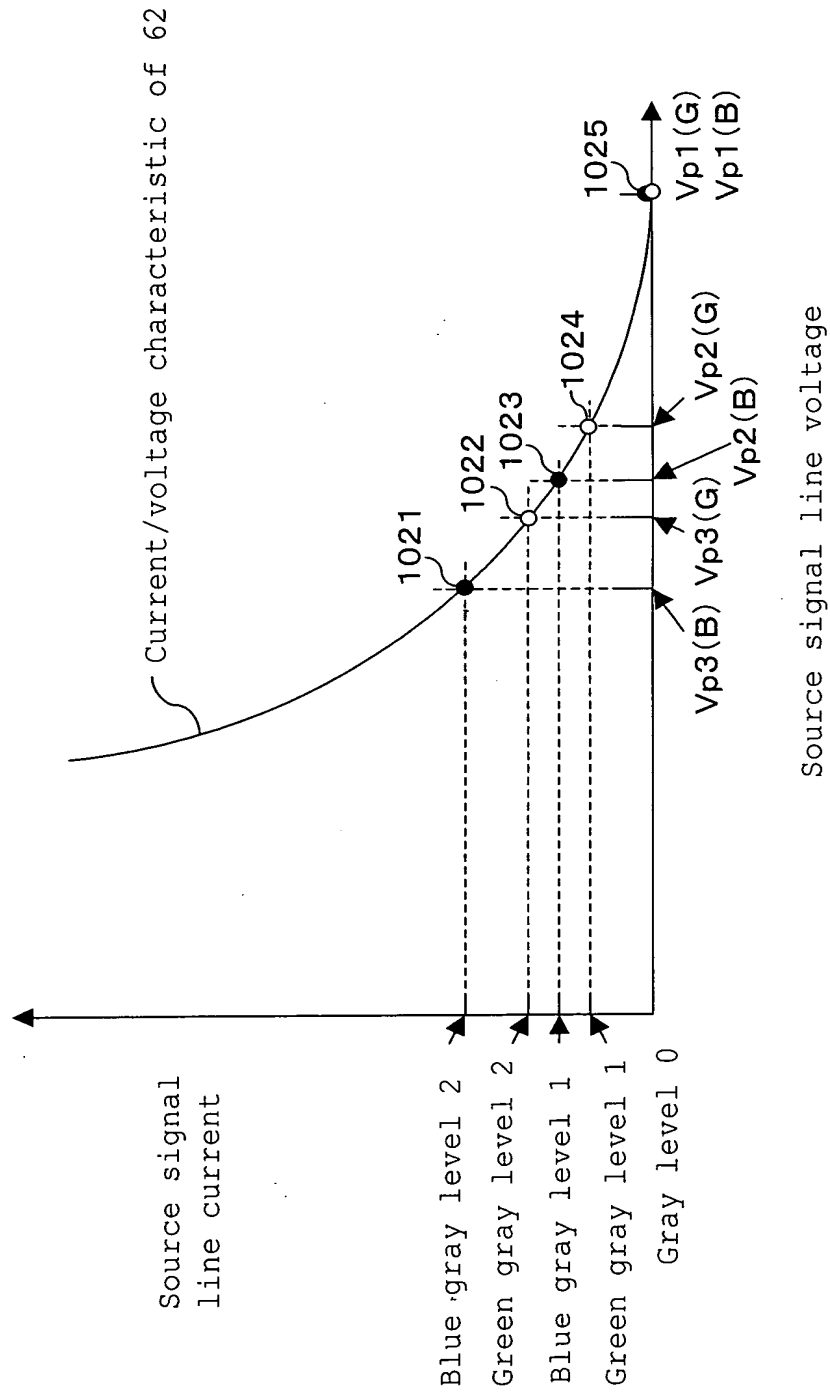


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Fig. 101

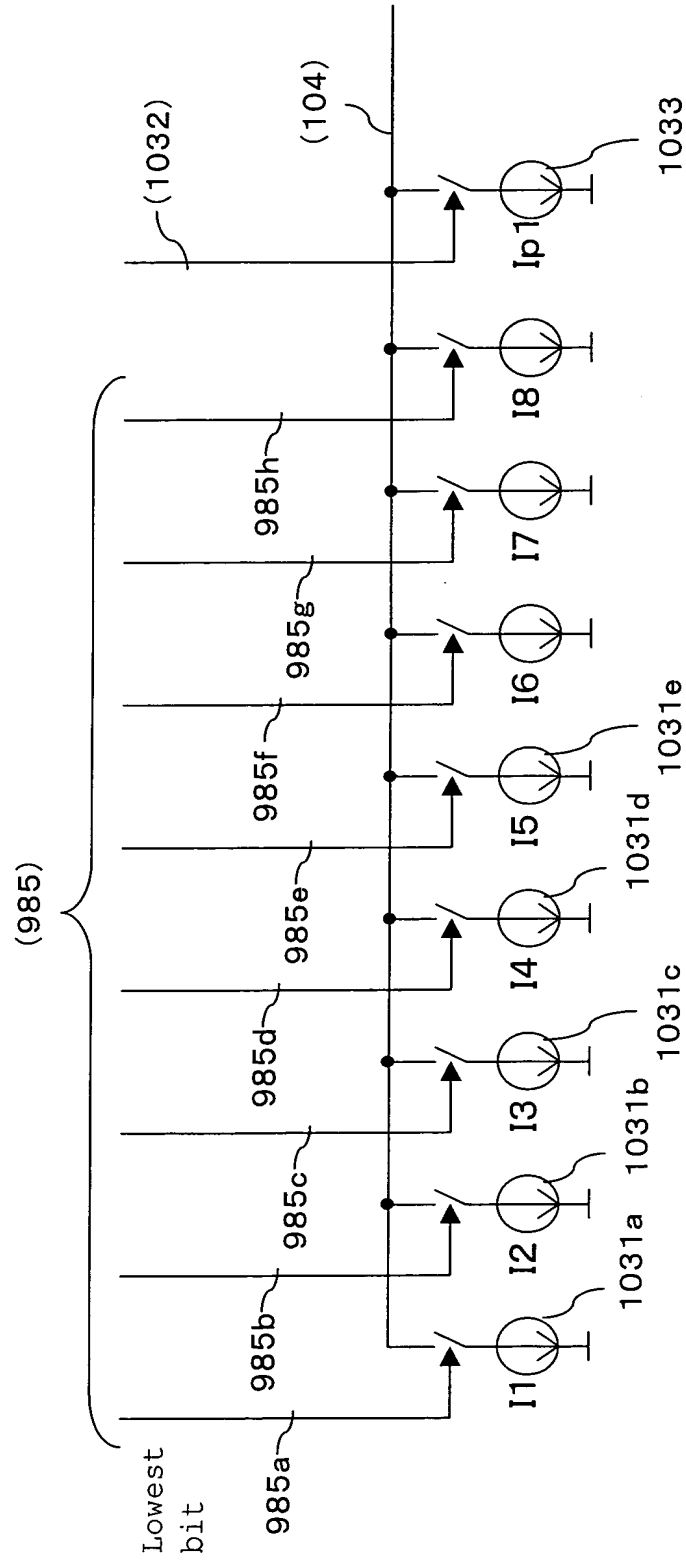
Precharge pulse(451)	Precharge determination line (984)	Output(1005)
0	0	Gray level current (104)
1	0	Gray level current (104)
0	1	Gray level current (104)
1	1	Vp1
0	2	Gray level current (104)
1	2	Vp2
0	3	Gray level current (104)
1	3	Vp3

Fig. 102



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Fig. 103



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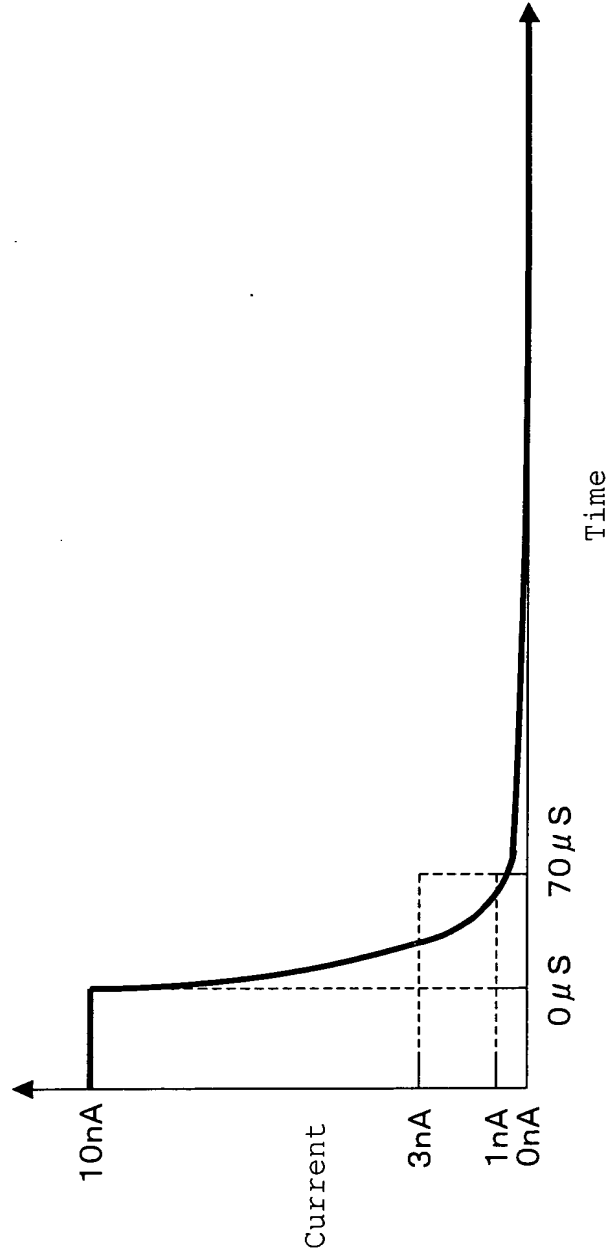


Fig. 104

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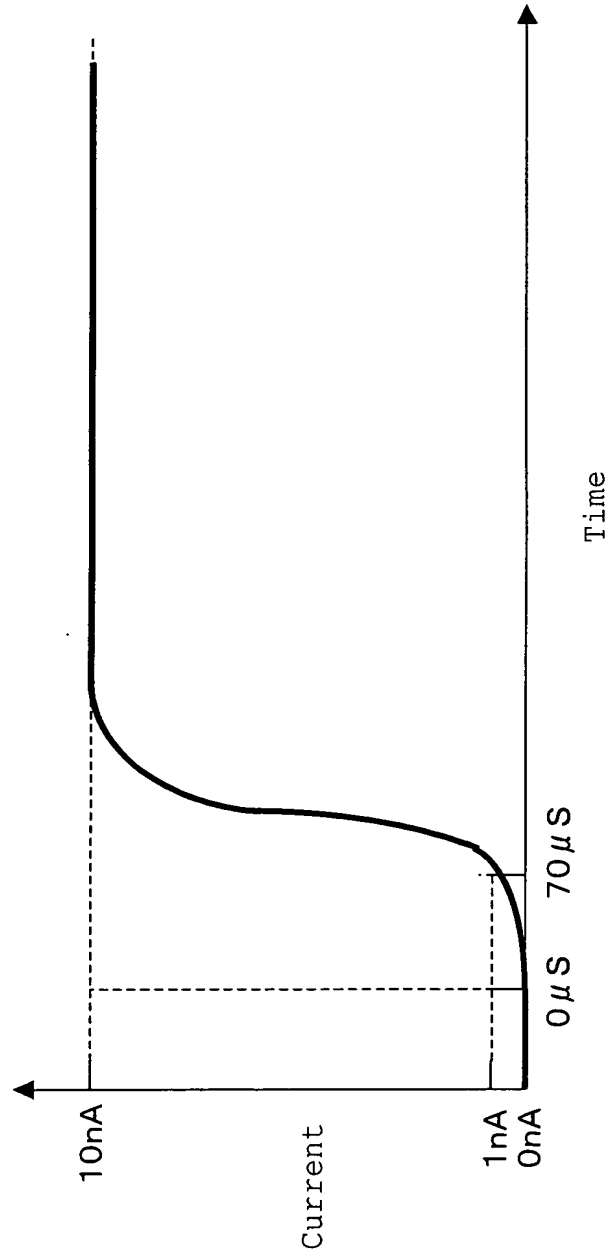
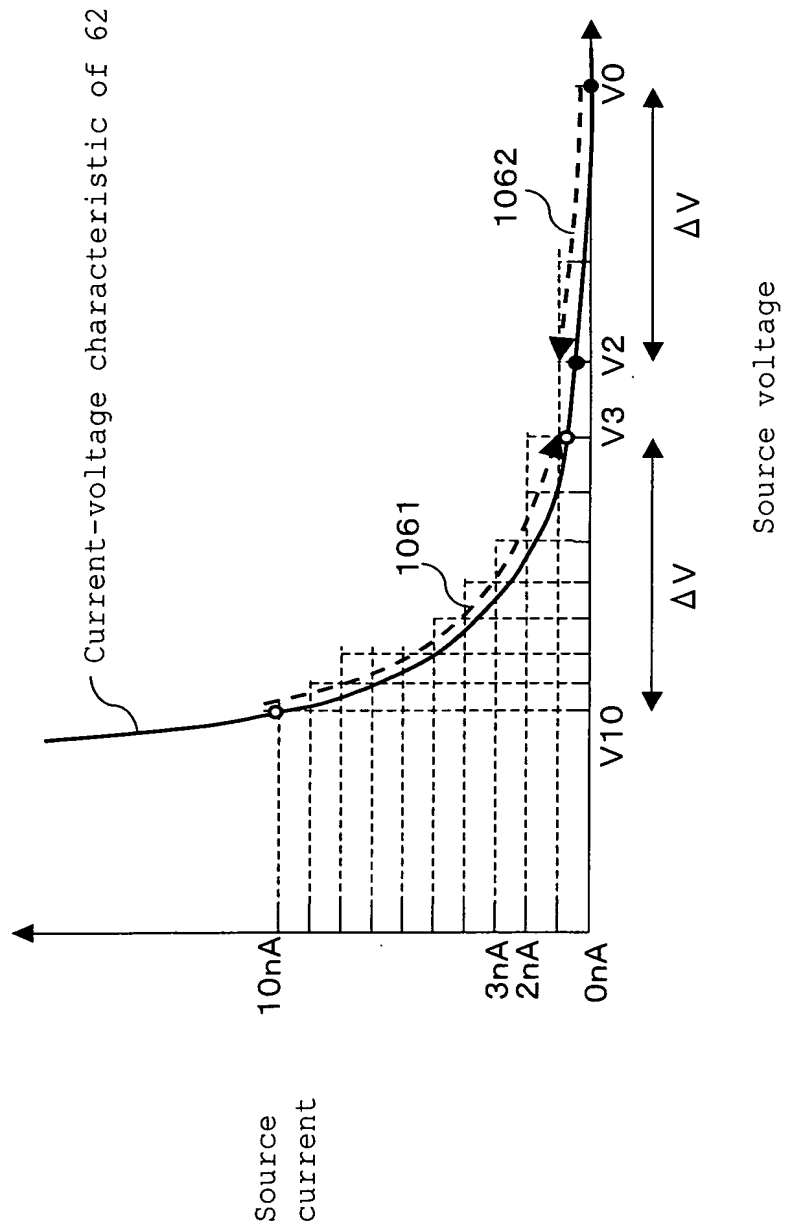


Fig. 105

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Fig. 106



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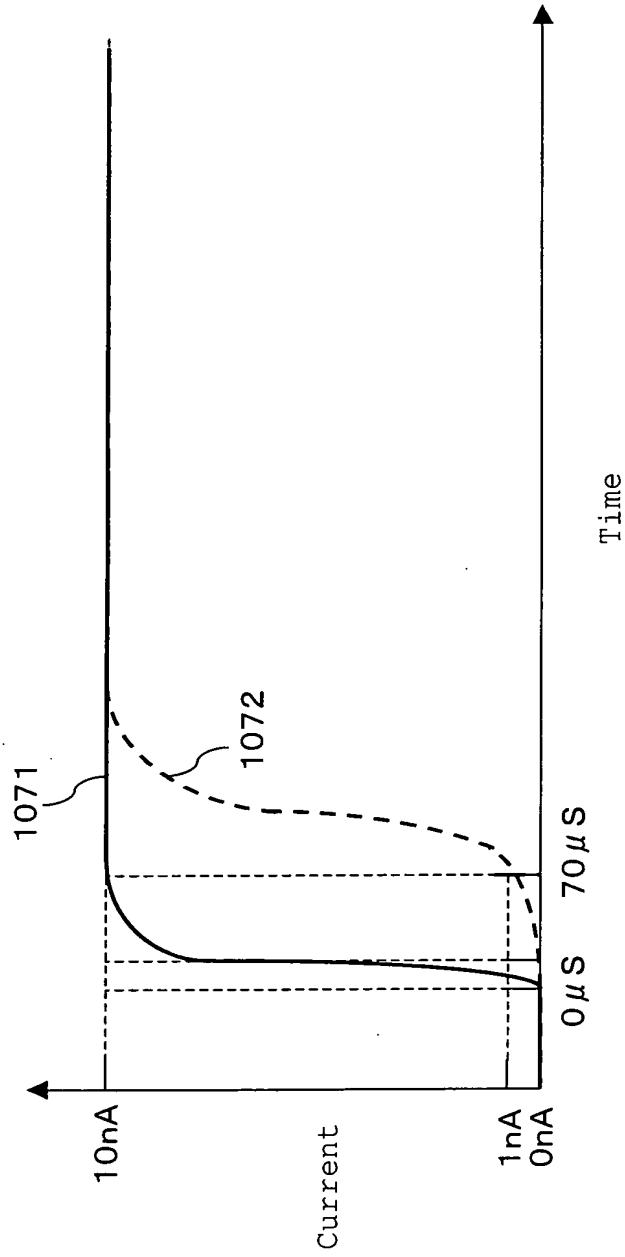


Fig. 107

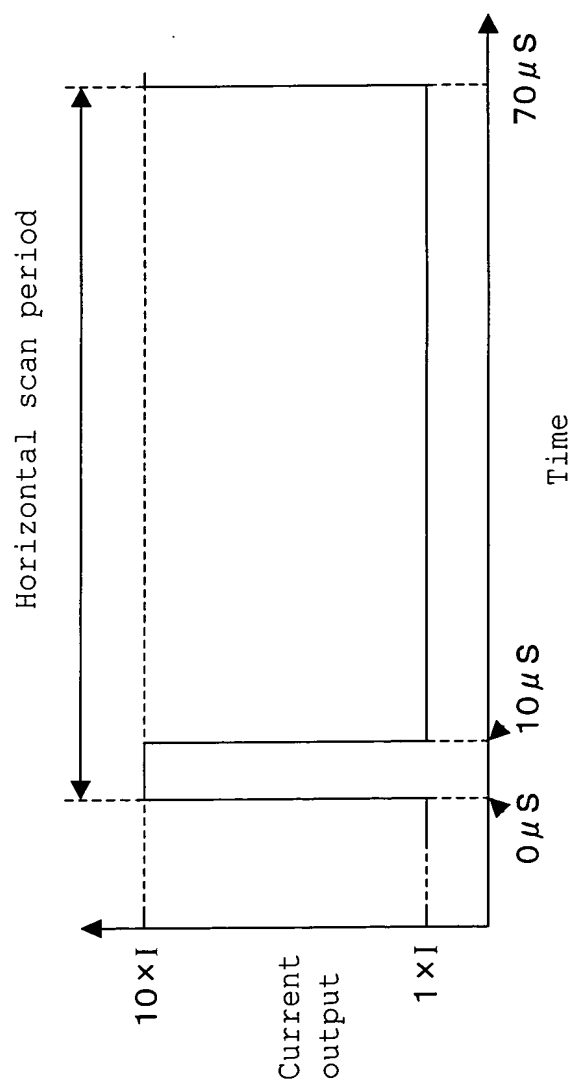
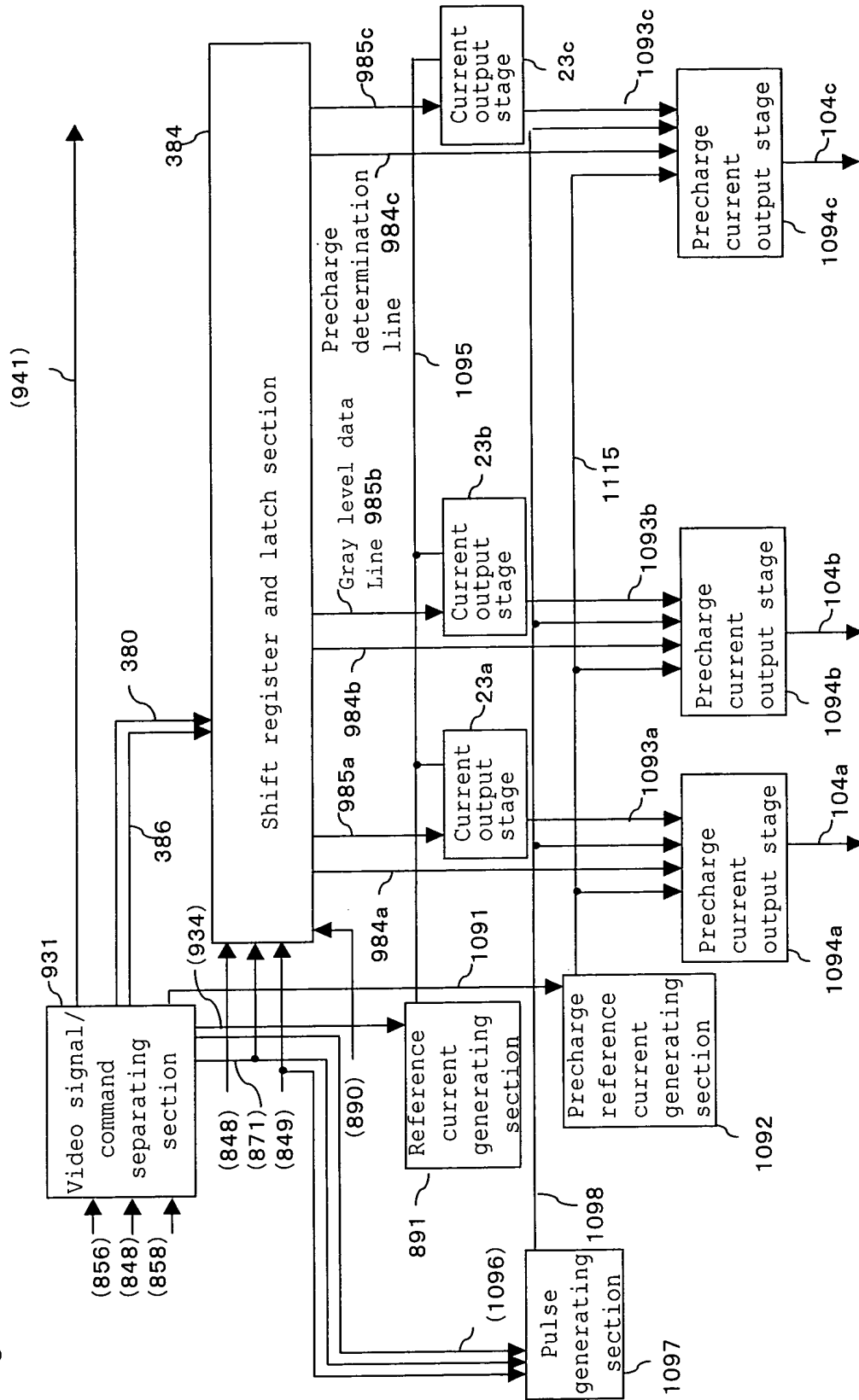


Fig. 108

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Fig. 109



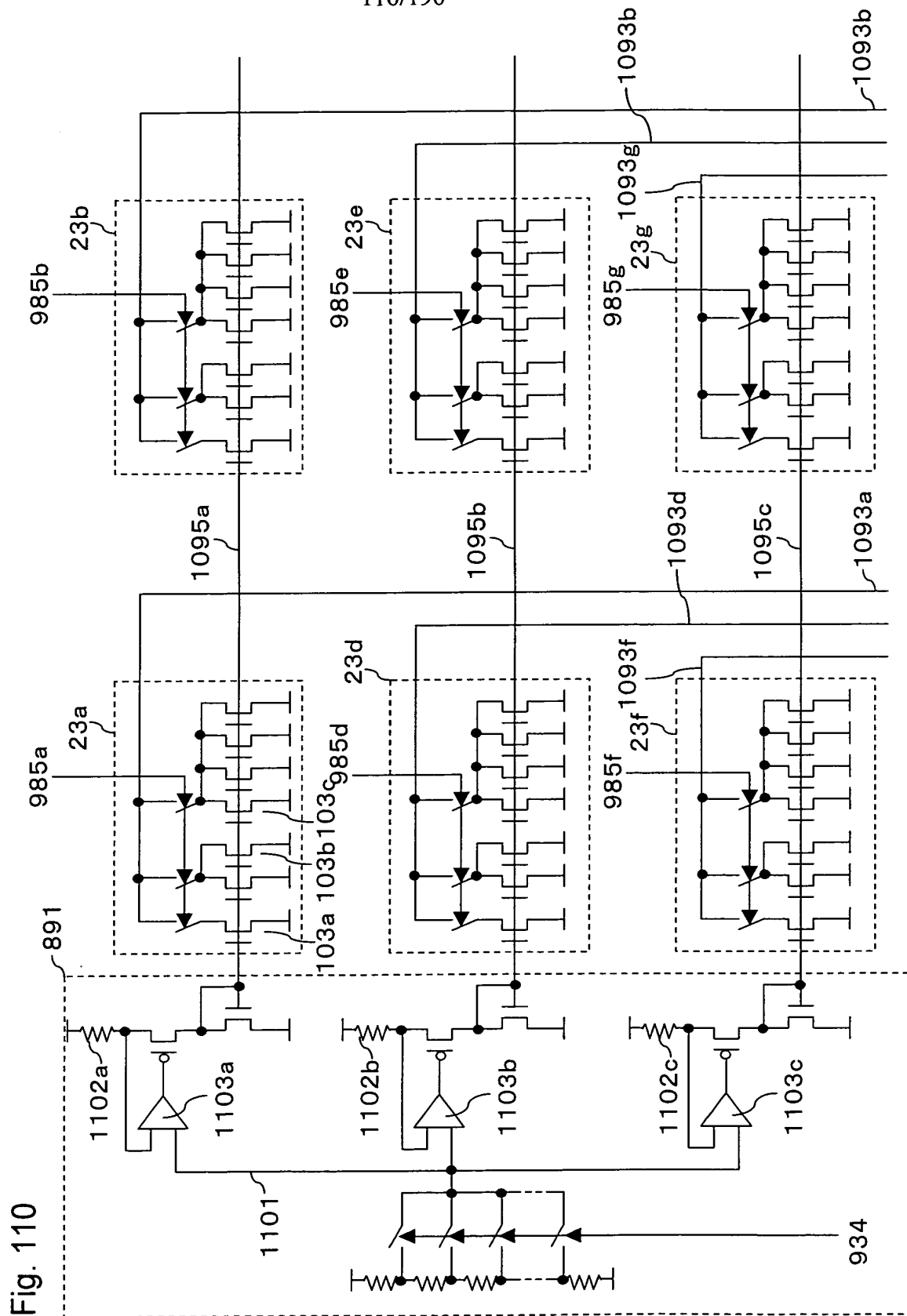
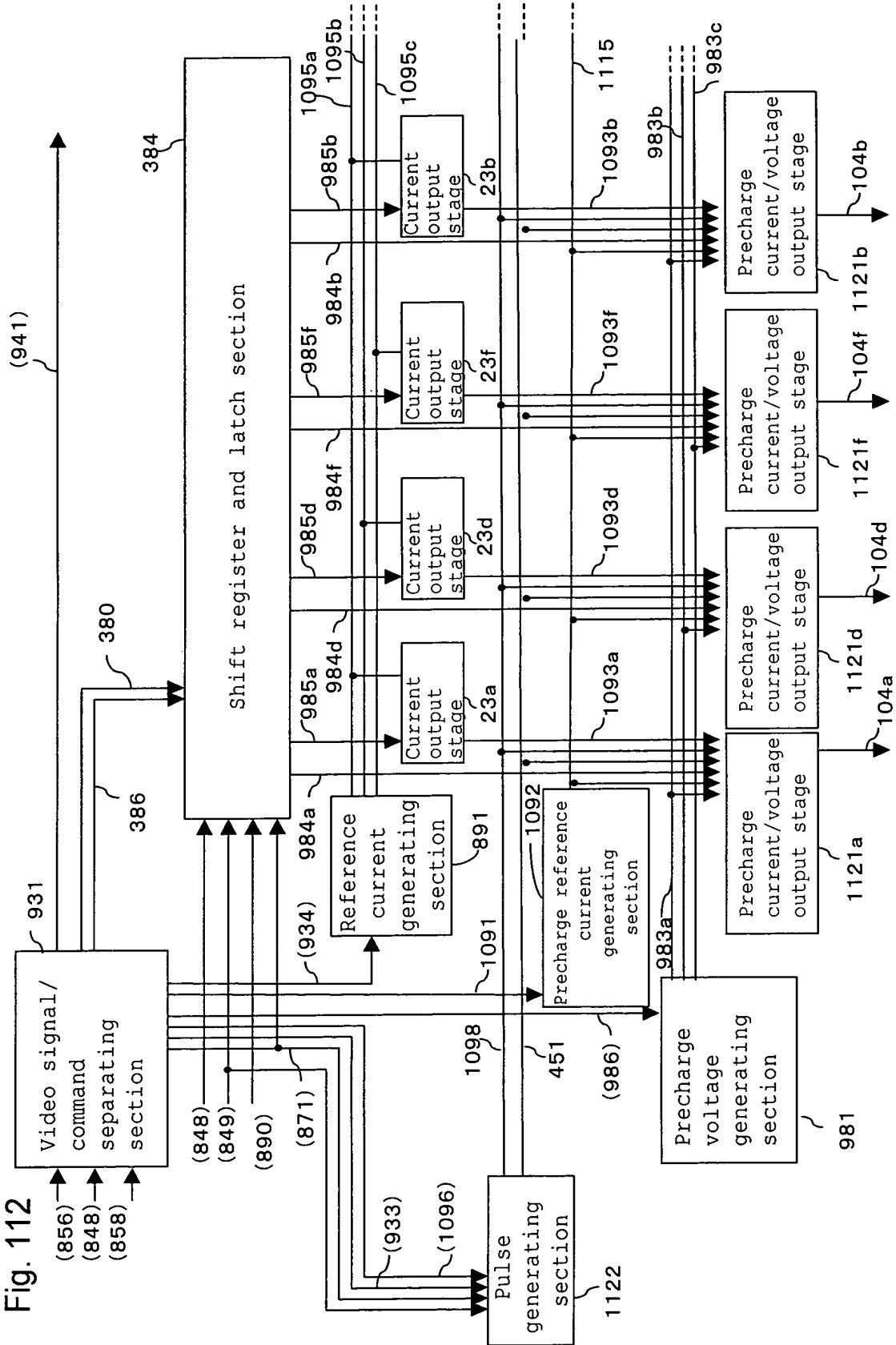


Fig. 112



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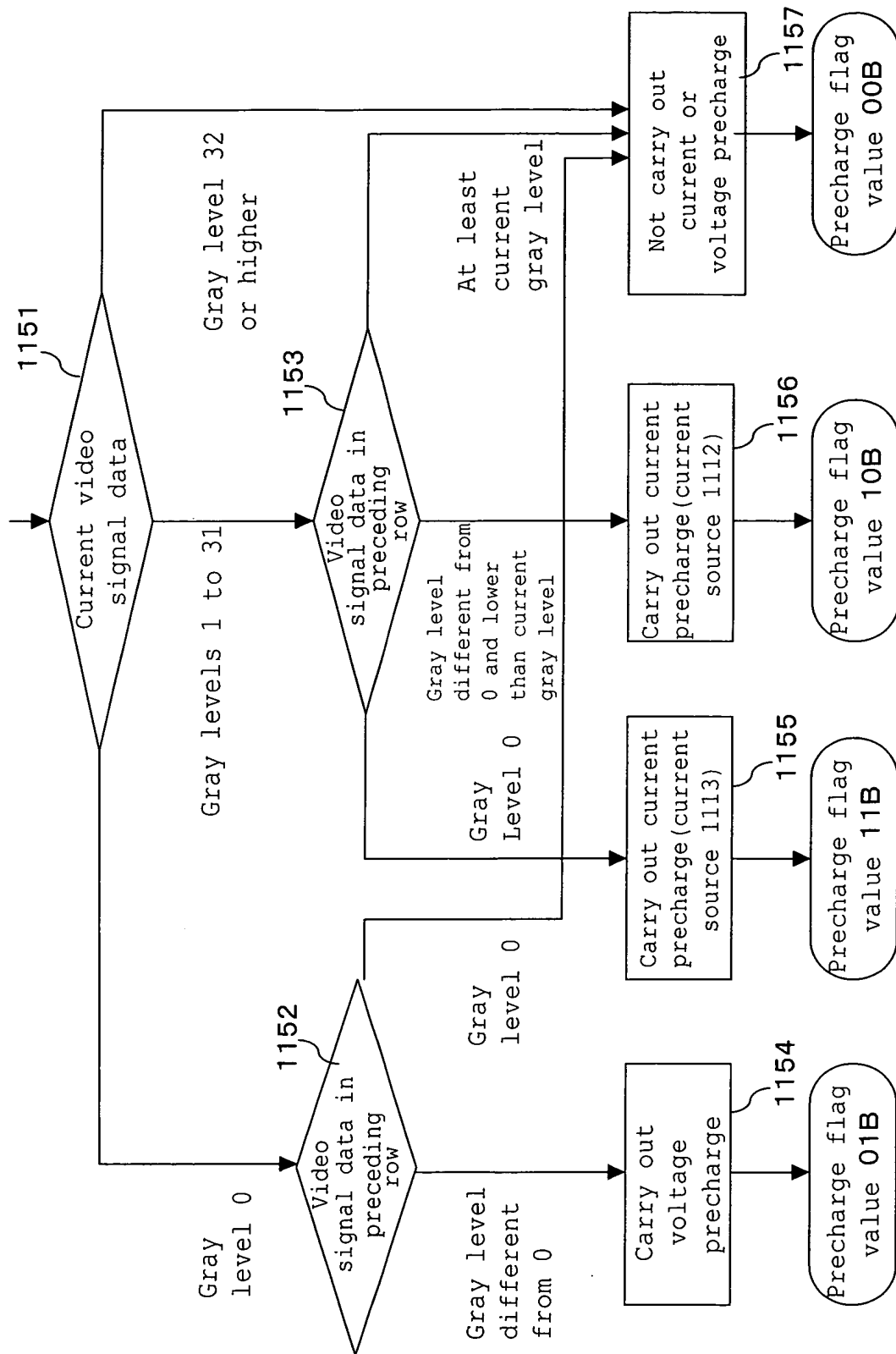
Fig. 114

984		451	1098	1132	1133	1134	1135	State
Upper bit	Lower bit							
0	0	X	X	OFF	OFF	ON	OFF	No precharge for current or voltage
0	1	0	X	OFF	OFF	ON	OFF	Voltage precharge
		1	X	OFF	OFF	OFF	ON	
1	0	X	0	OFF	OFF	ON	OFF	Current precharge (current source 1112)
		X	1	ON	OFF	OFF	OFF	
1	1	X	0	OFF	OFF	ON	OFF	Current precharge (current source 1113)
		X	1	OFF	ON	OFF	OFF	

X indicates Don't care

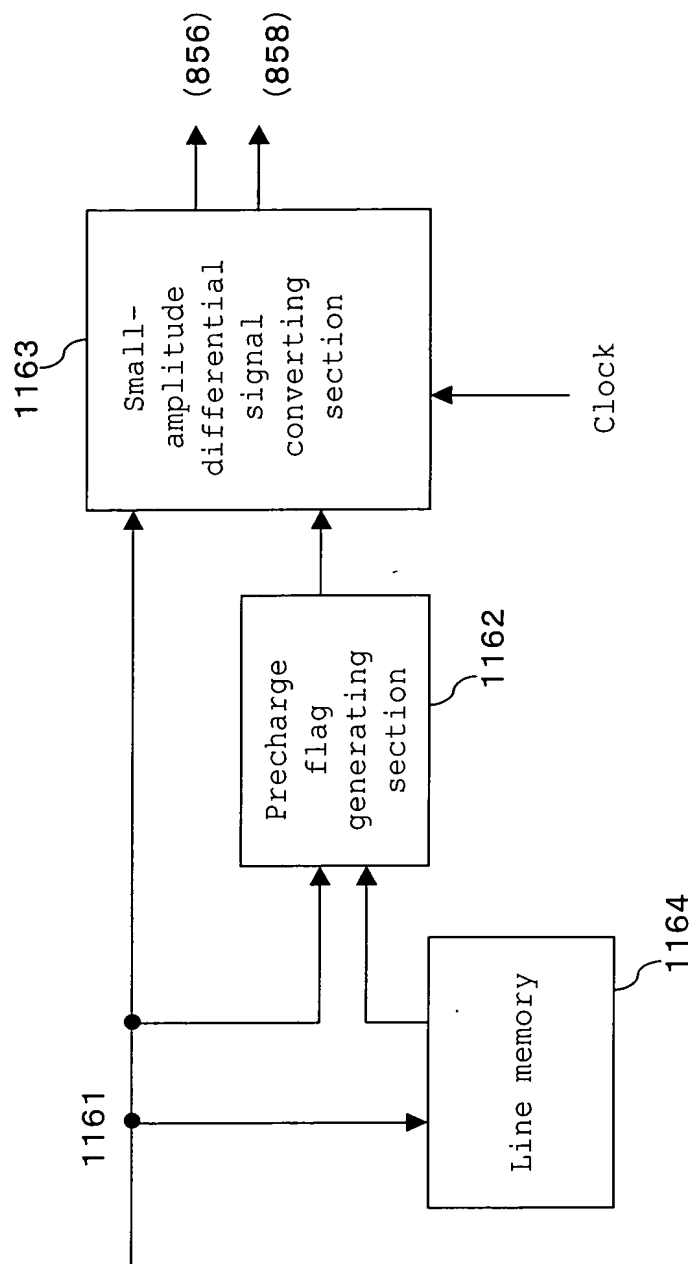
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Fig. 115



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Fig. 116



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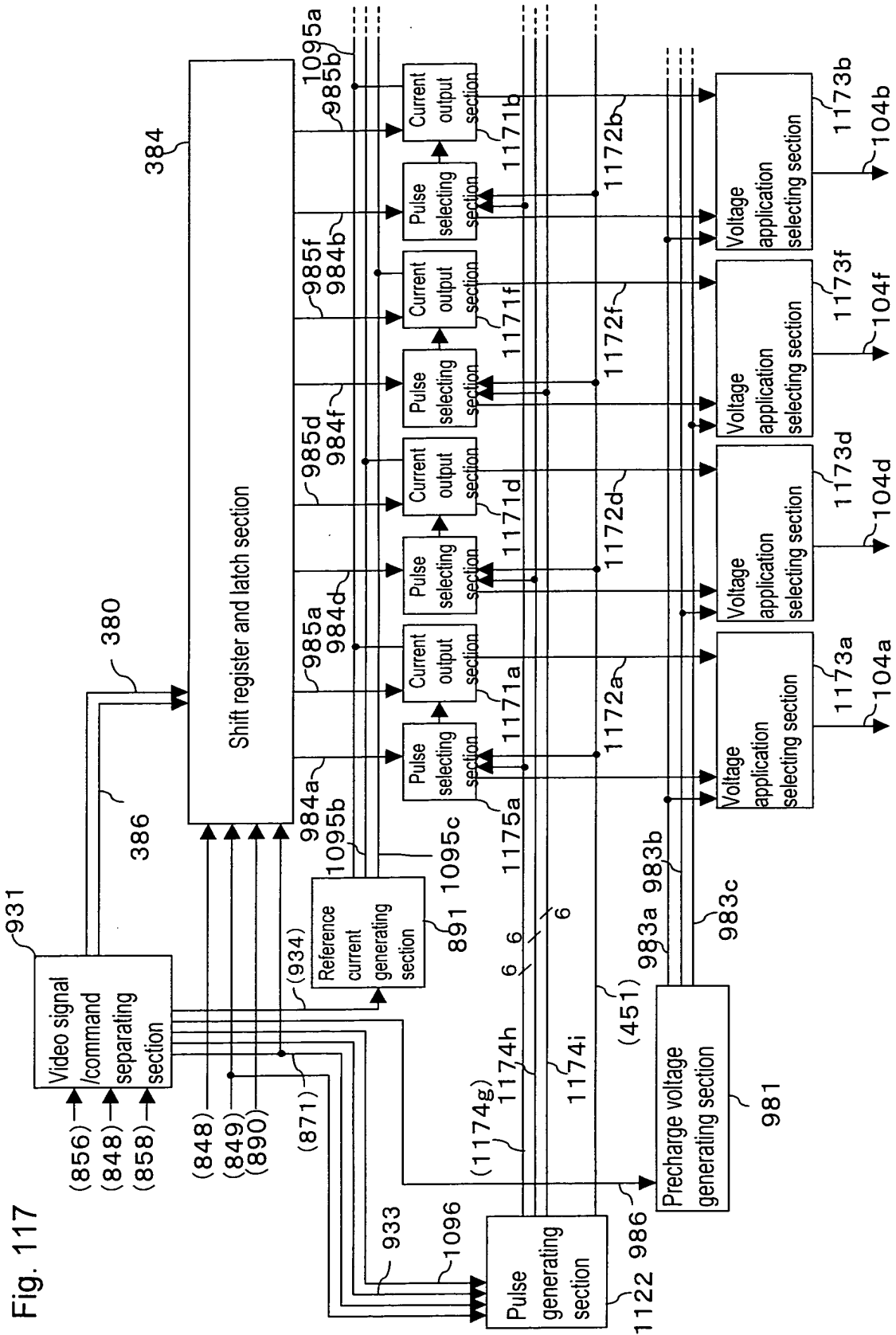
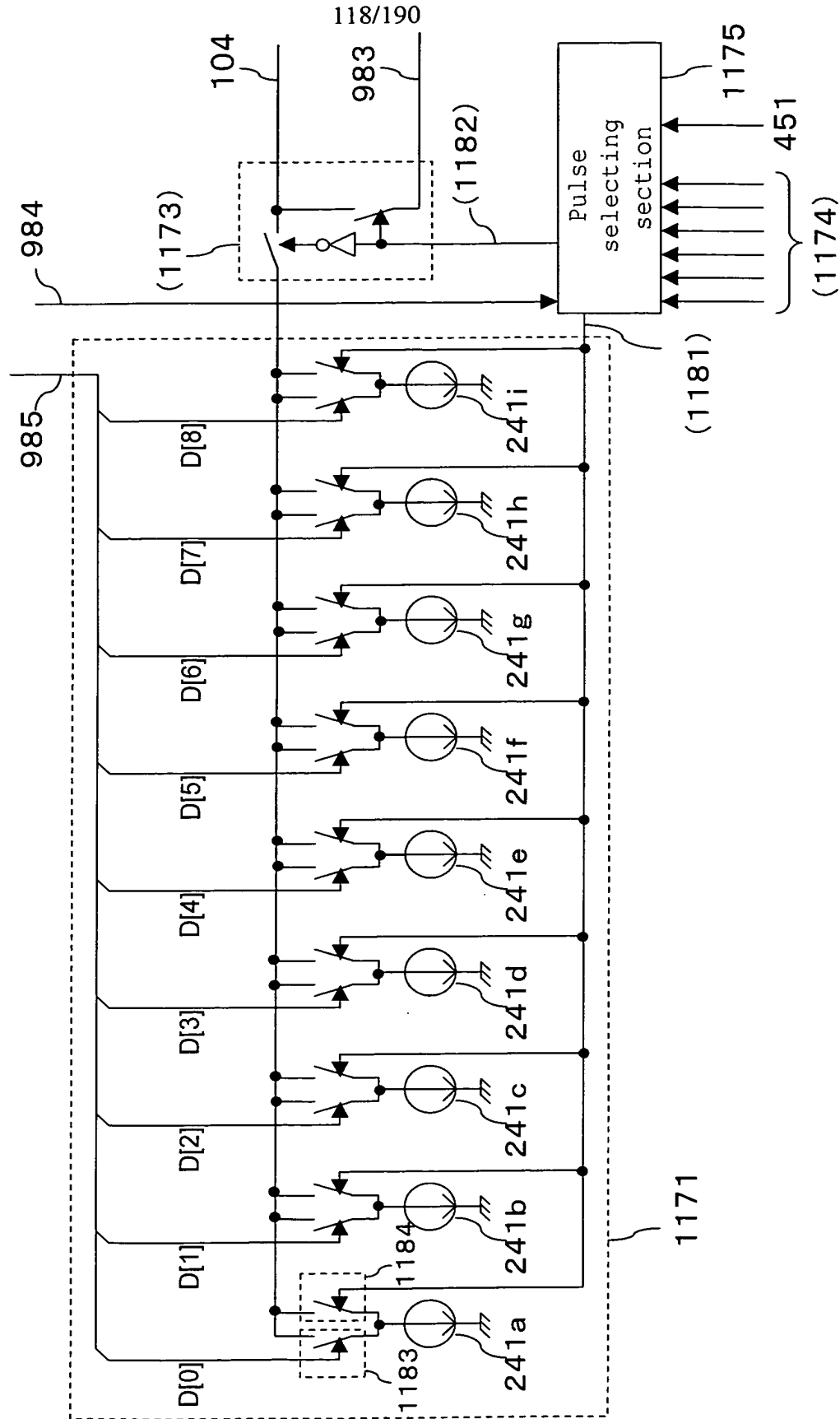


Fig. 118



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Fig. 119

Precharge determination line(984)			Current precharge control line(1181)	Voltage precharge control line(1182)
Highest bit	Middle bit	Lowest bit		
0	0	0	Always at "L" level	Always at "L" level
0	0	1	Same as 1174a	Same as 451
0	1	0	Same as 1174b	Same as 451
0	1	1	Same as 1174c	Same as 451
1	0	0	Same as 1174d	Same as 451
1	0	1	Same as 1174e	Same as 451
1	1	0	Same as 1174f	Same as 451
1	1	1	Always at "L" level	Same as 451

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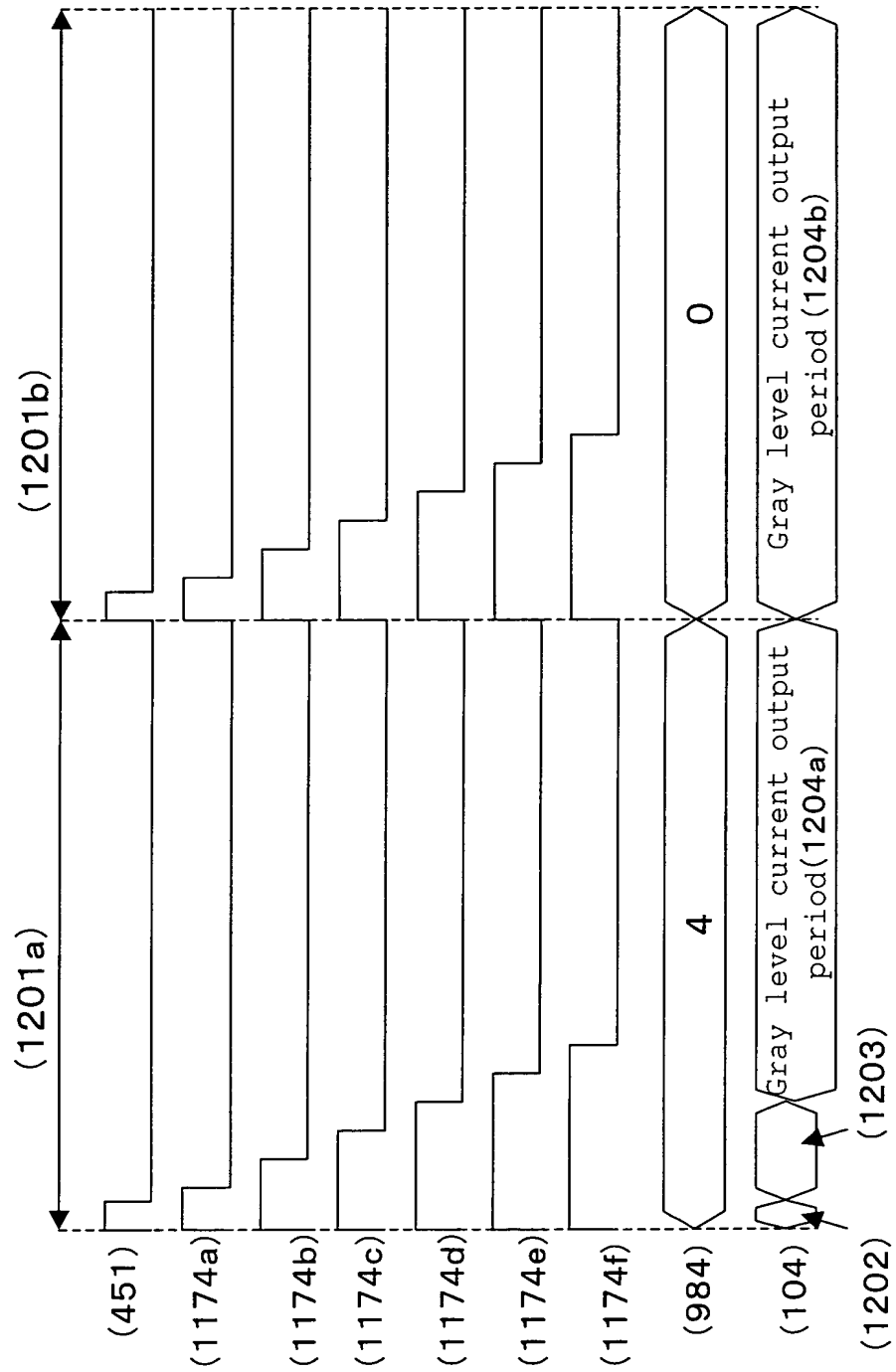


Fig. 120

Fig. 121 (a)

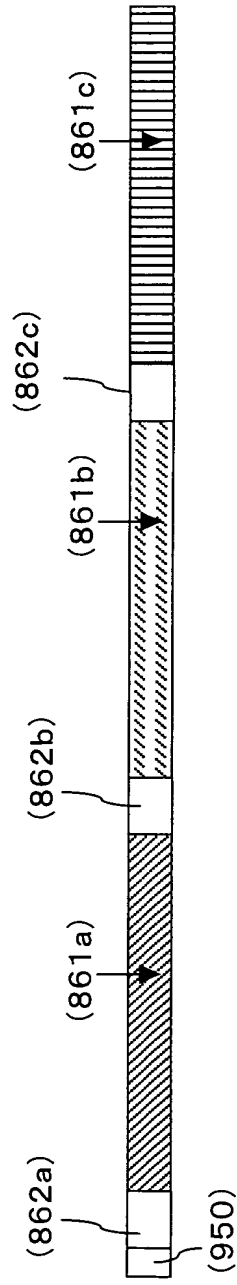


Fig. 121 (b)

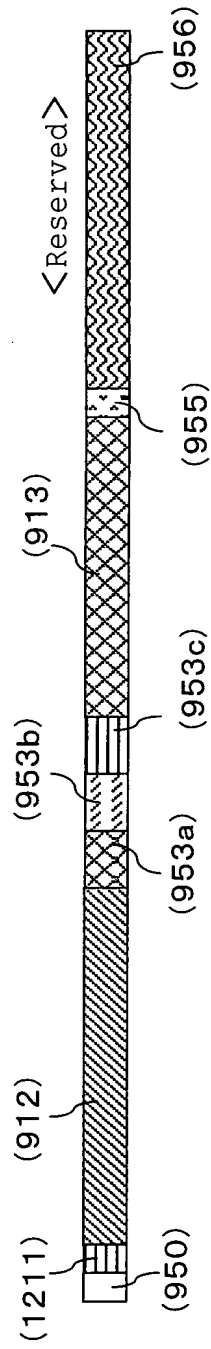
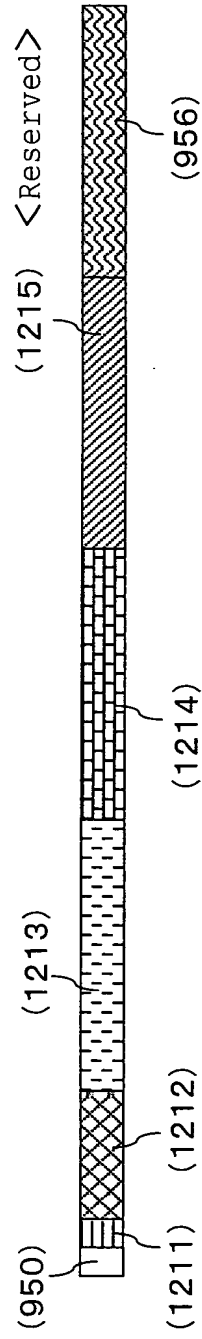


Fig. 121 (c)



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Fig. 122

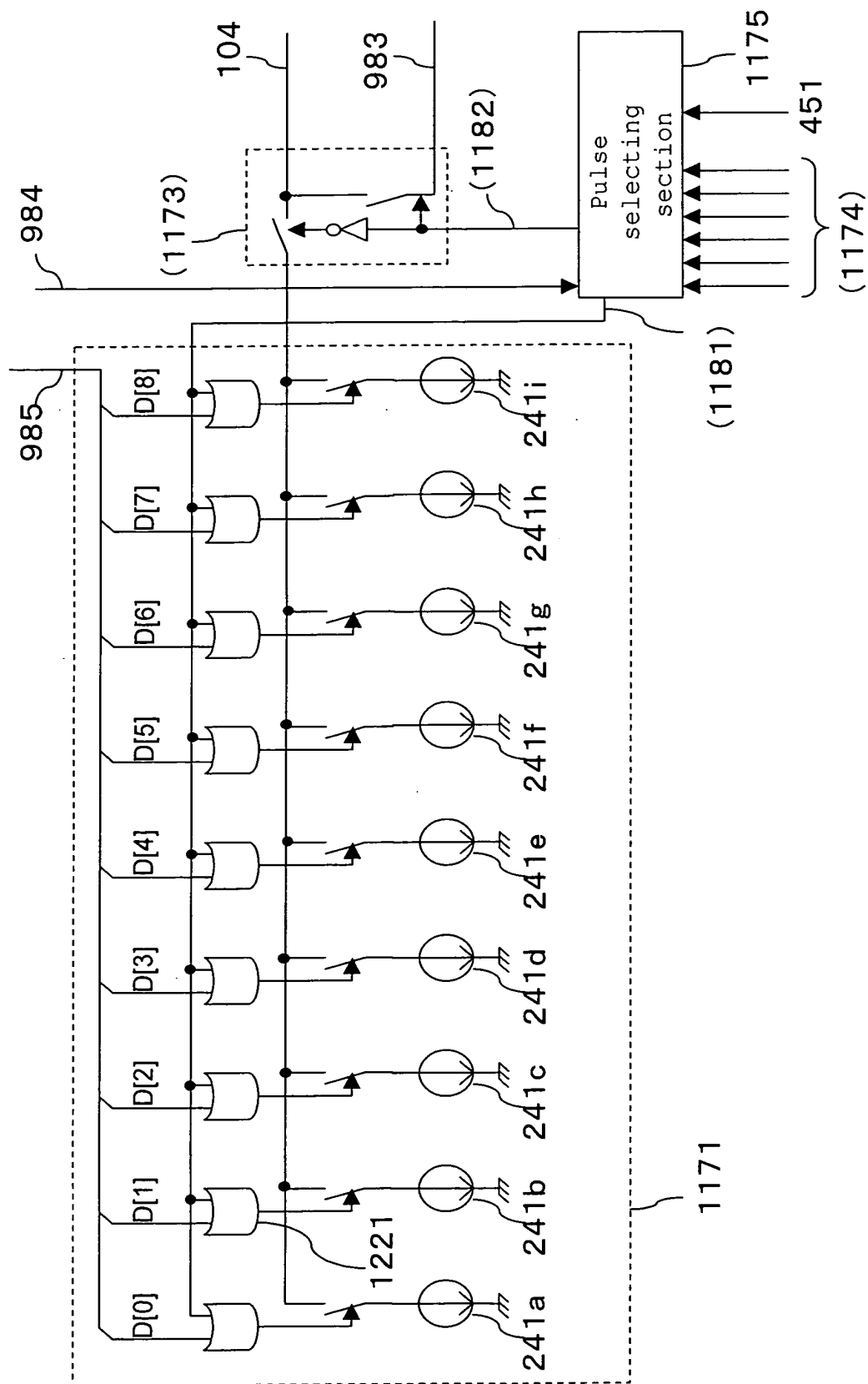
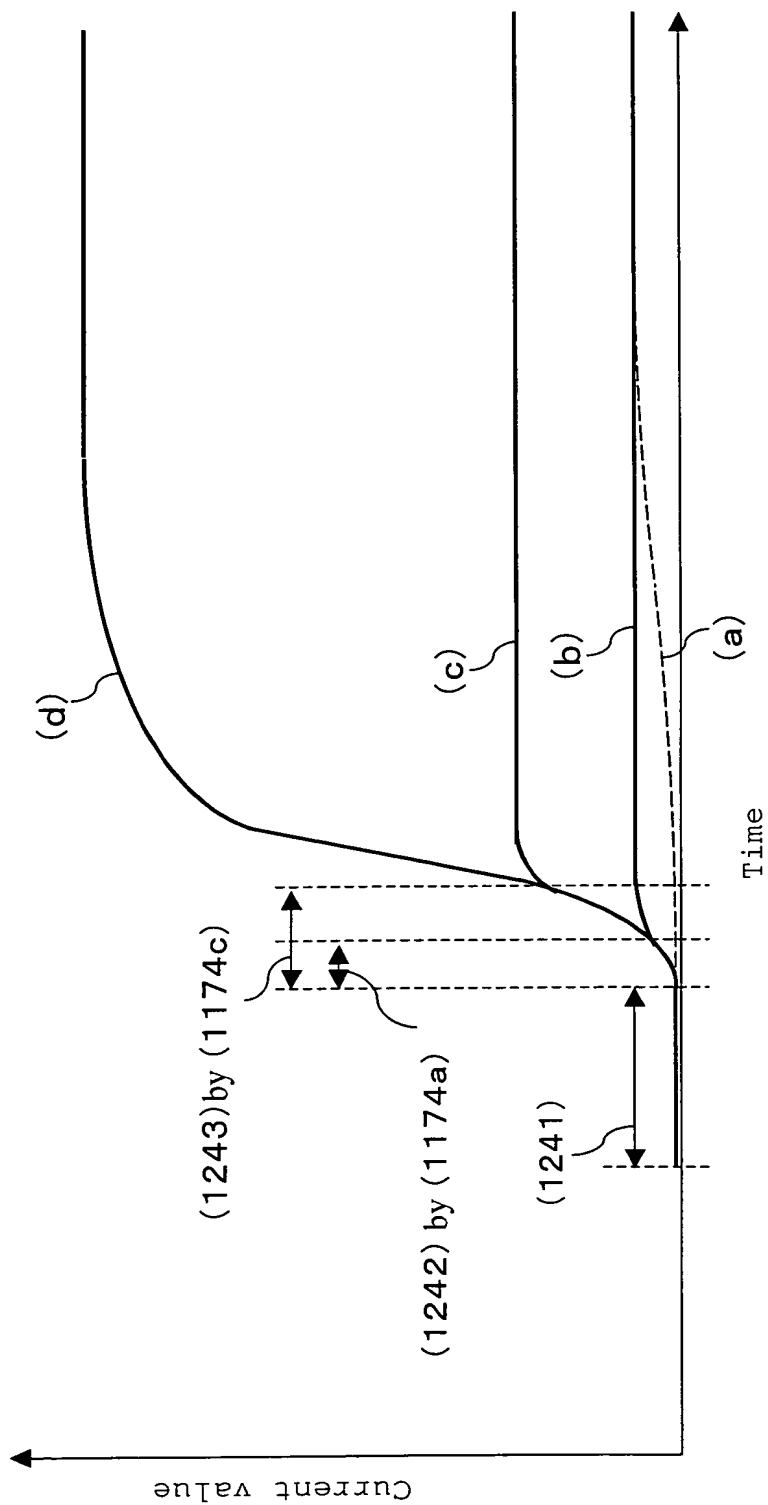


Fig. 123

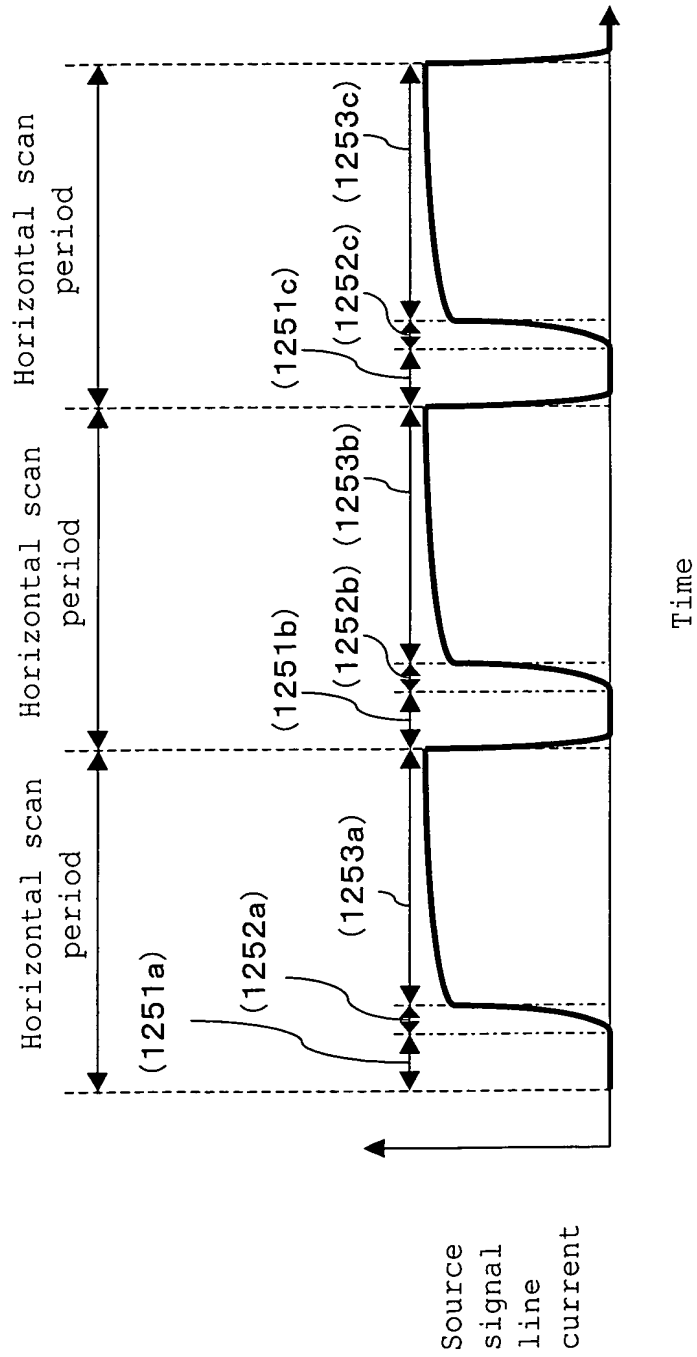
Gray level	Precharge current output period	Use of only current precharge pulse
0	None	None (only voltage precharge)
1	0.4 μ s	1174a
2	0.8 μ s	1174b
3	1.2 μ s	1174c
4	1.6 μ s	1174d
5	2.0 μ s	1174e
6~35	2.4 μ s	1174f
36~255	None	None

Fig. 124



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Fig. 125



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Fig. 126

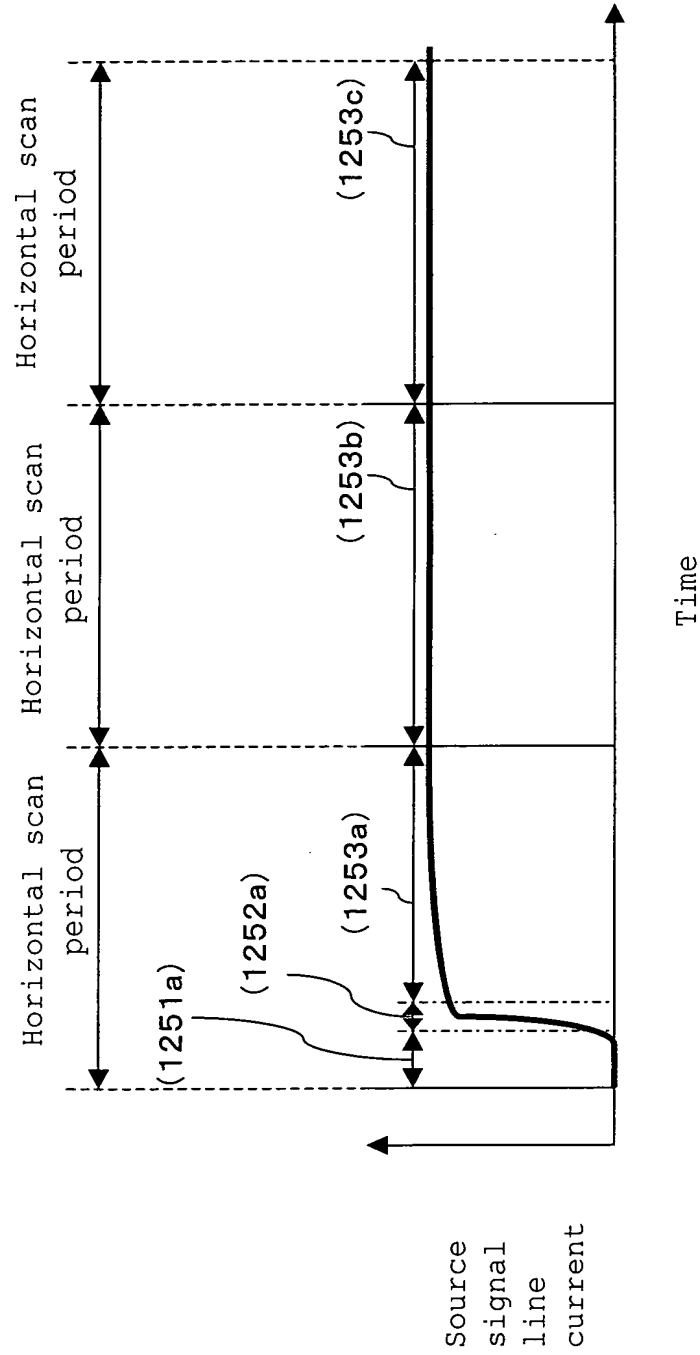
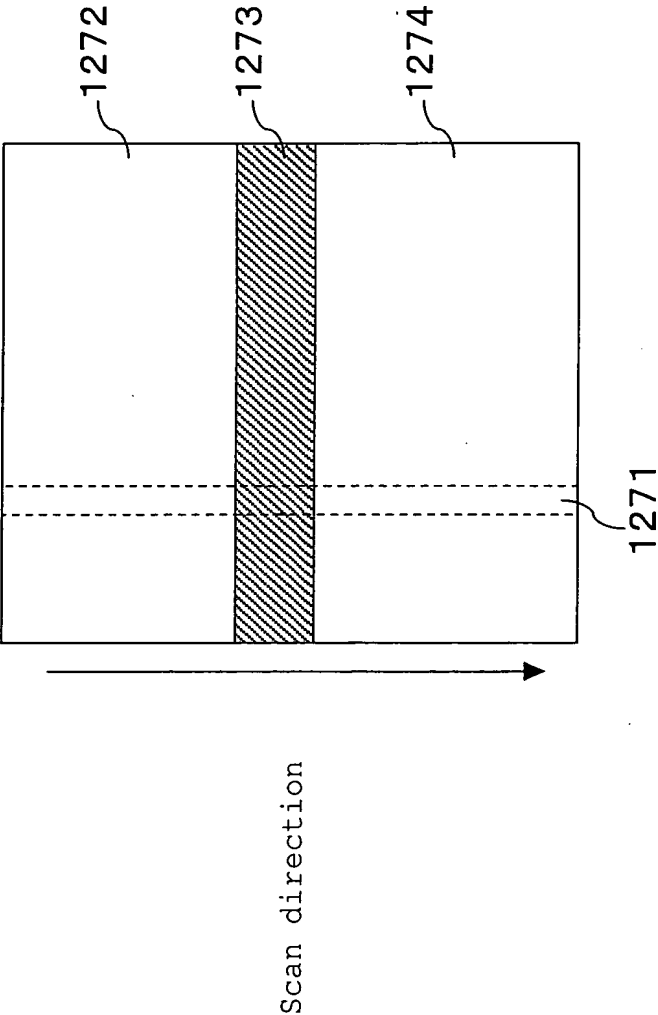
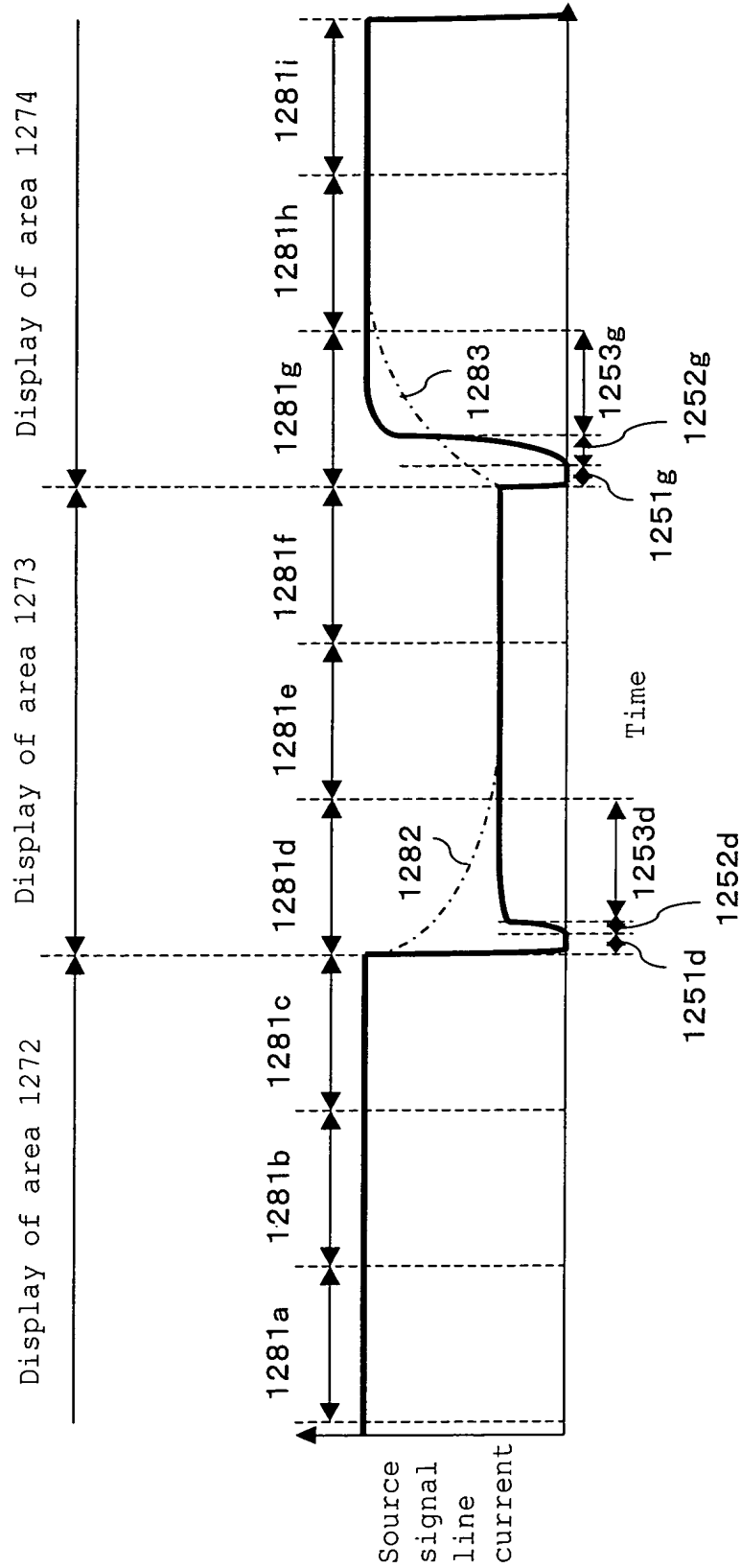


Fig. 127



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Fig. 128



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Fig. 129

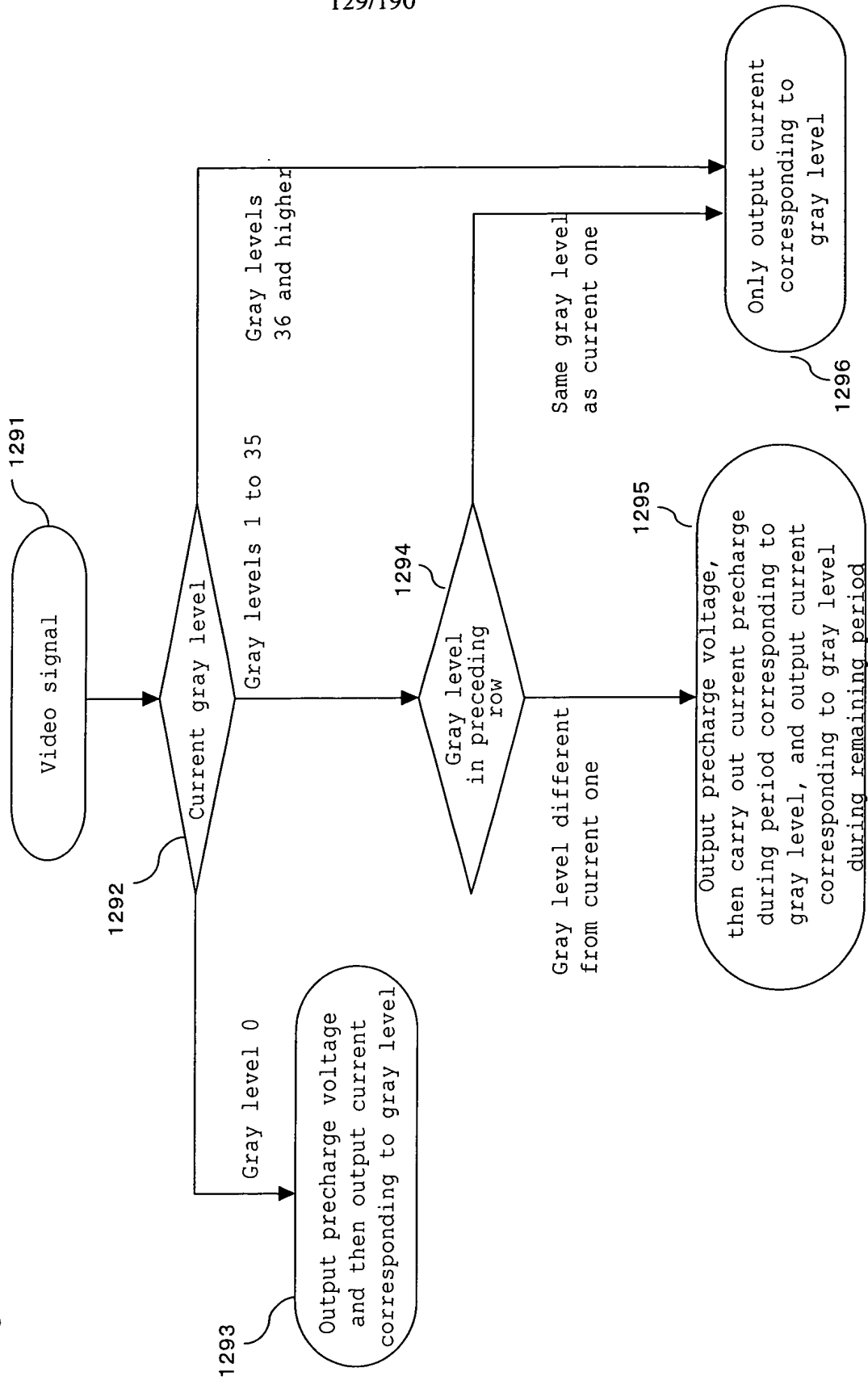
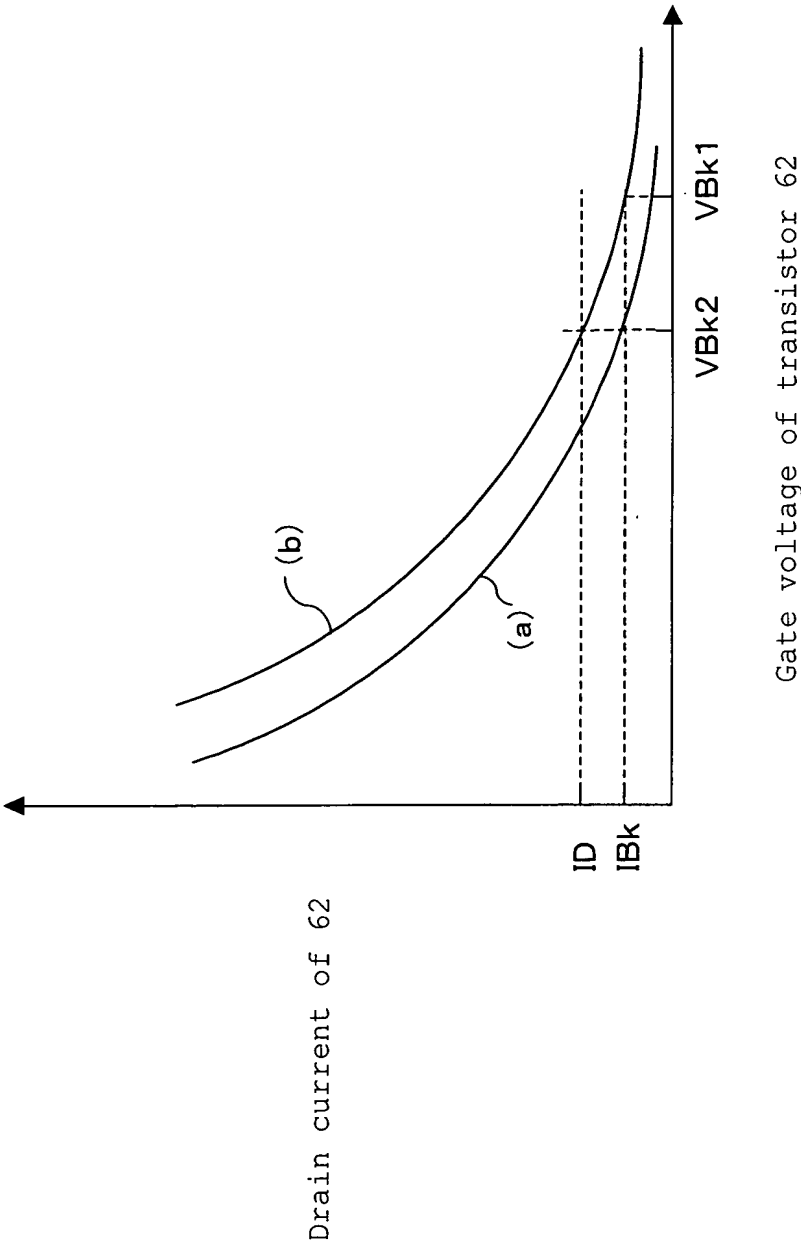


Fig. 130



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Fig. 131

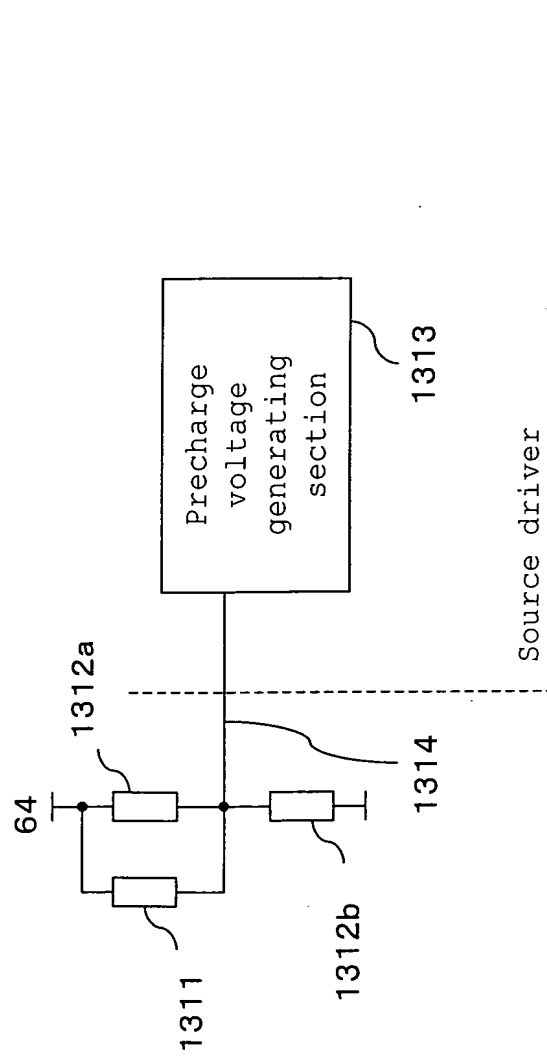
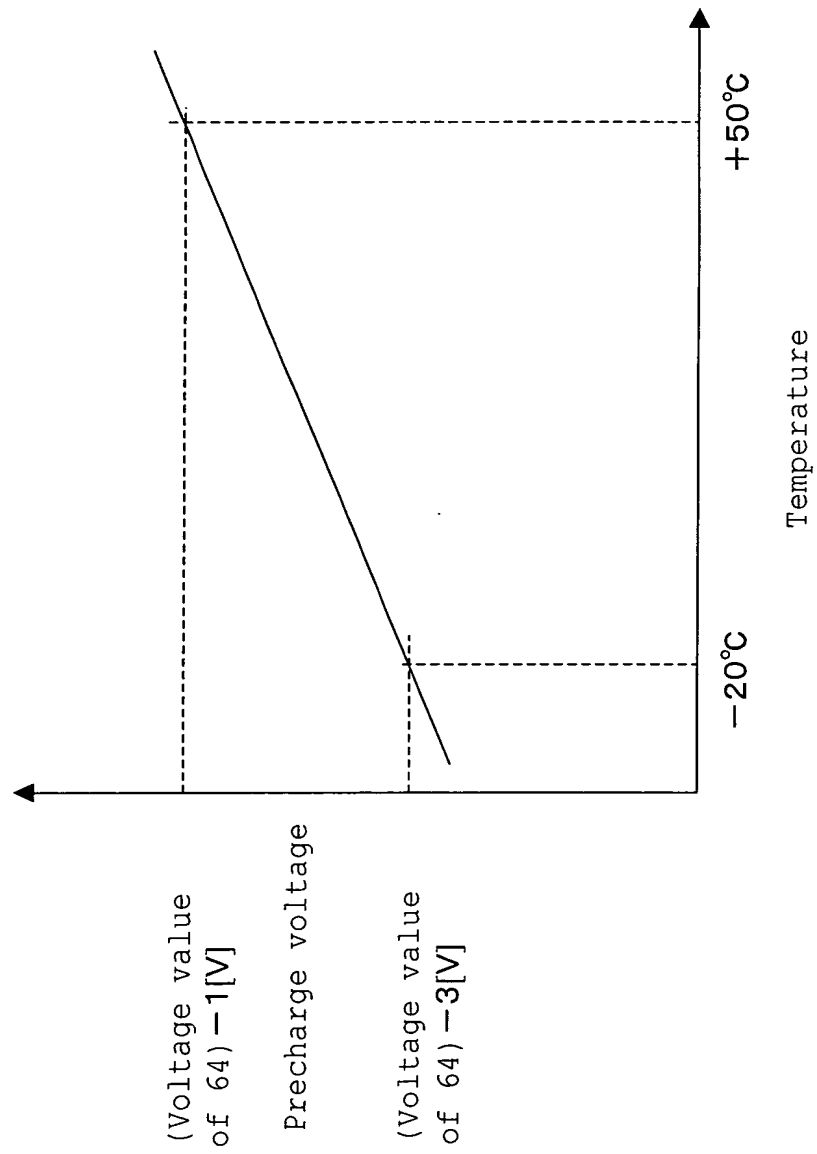


Fig. 132



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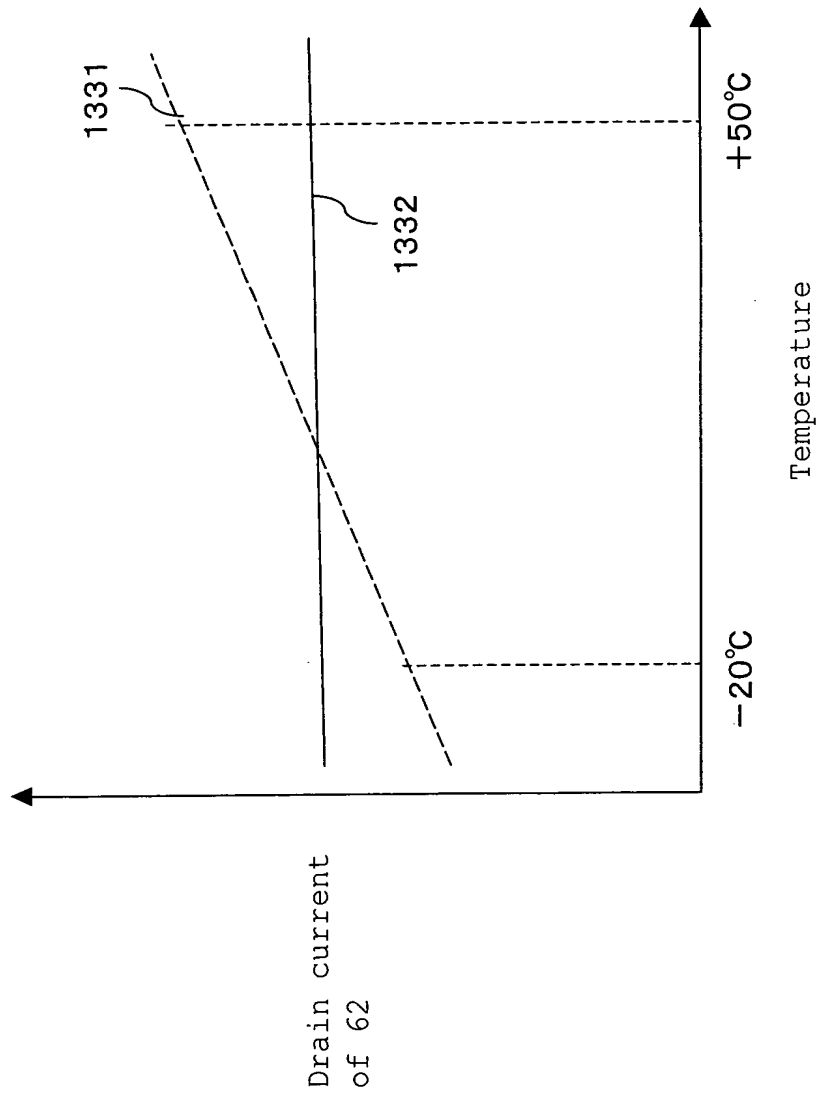


Fig. 133

Fig. 134

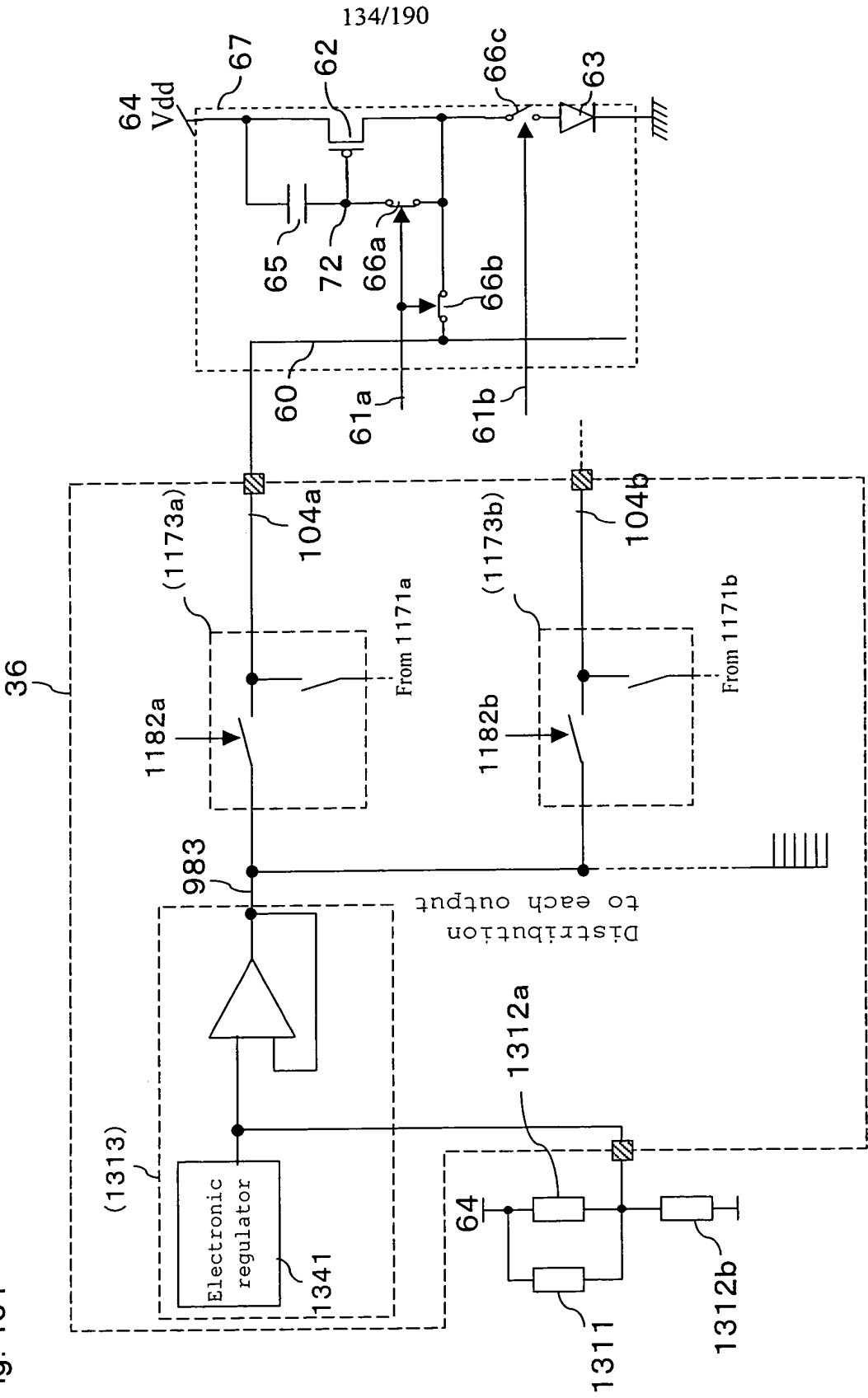
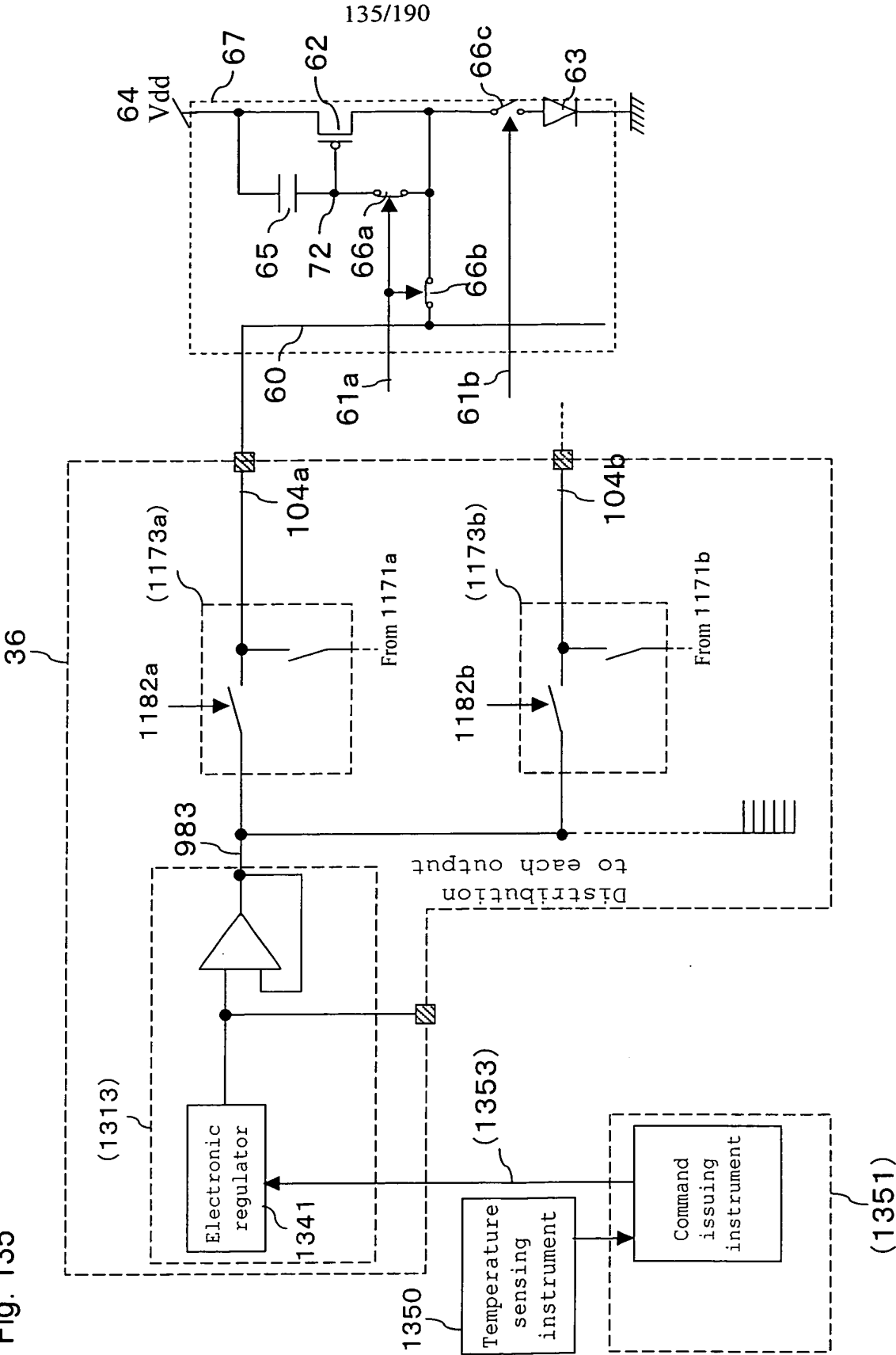
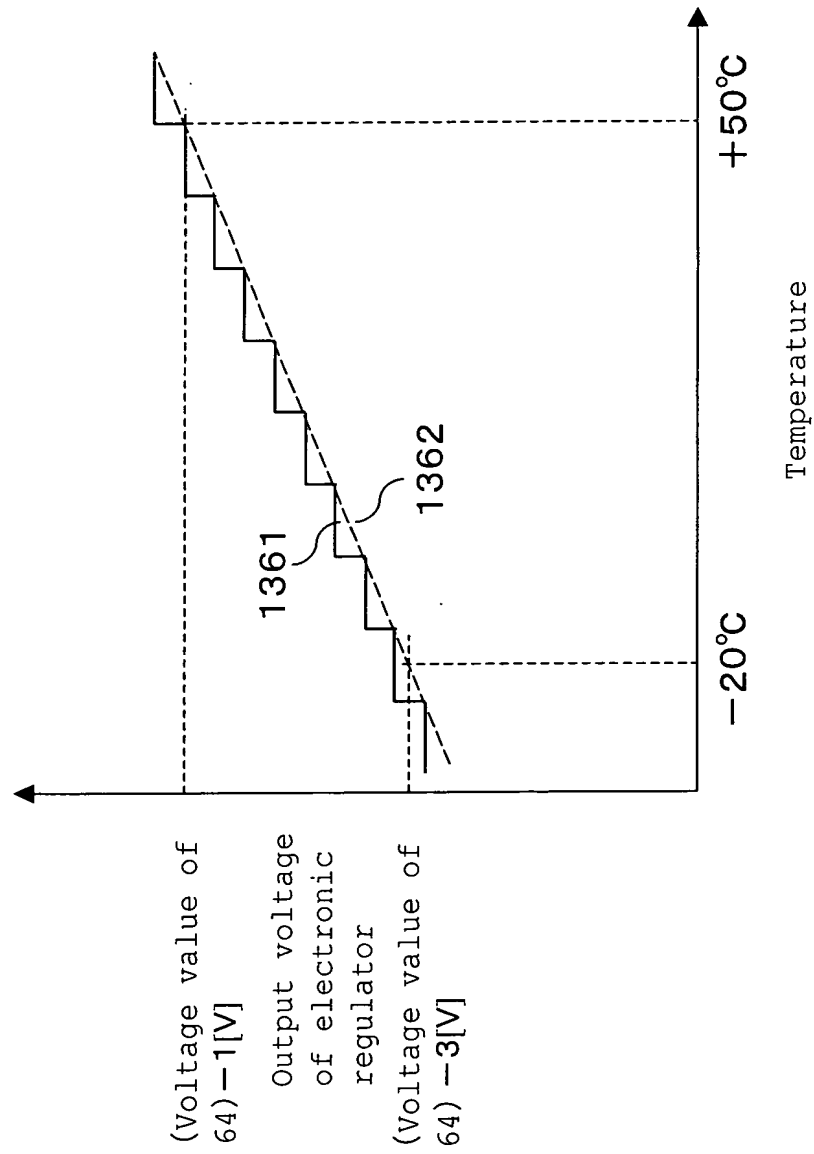


Fig. 135



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Fig. 136



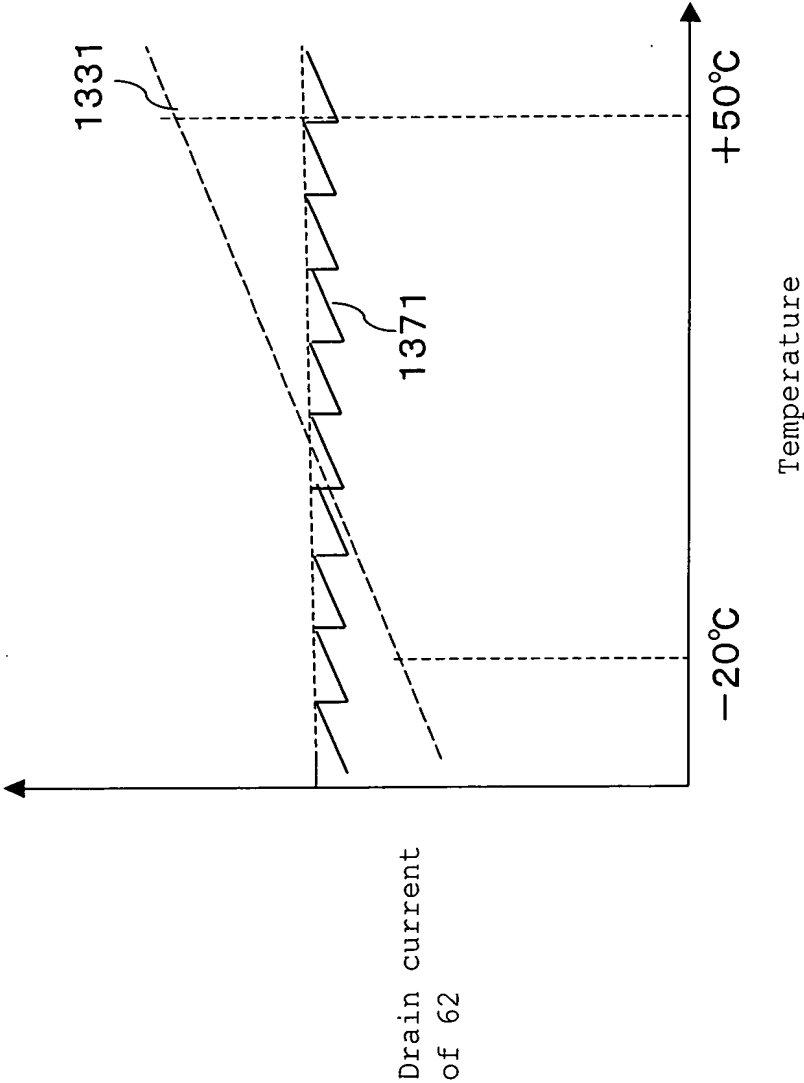
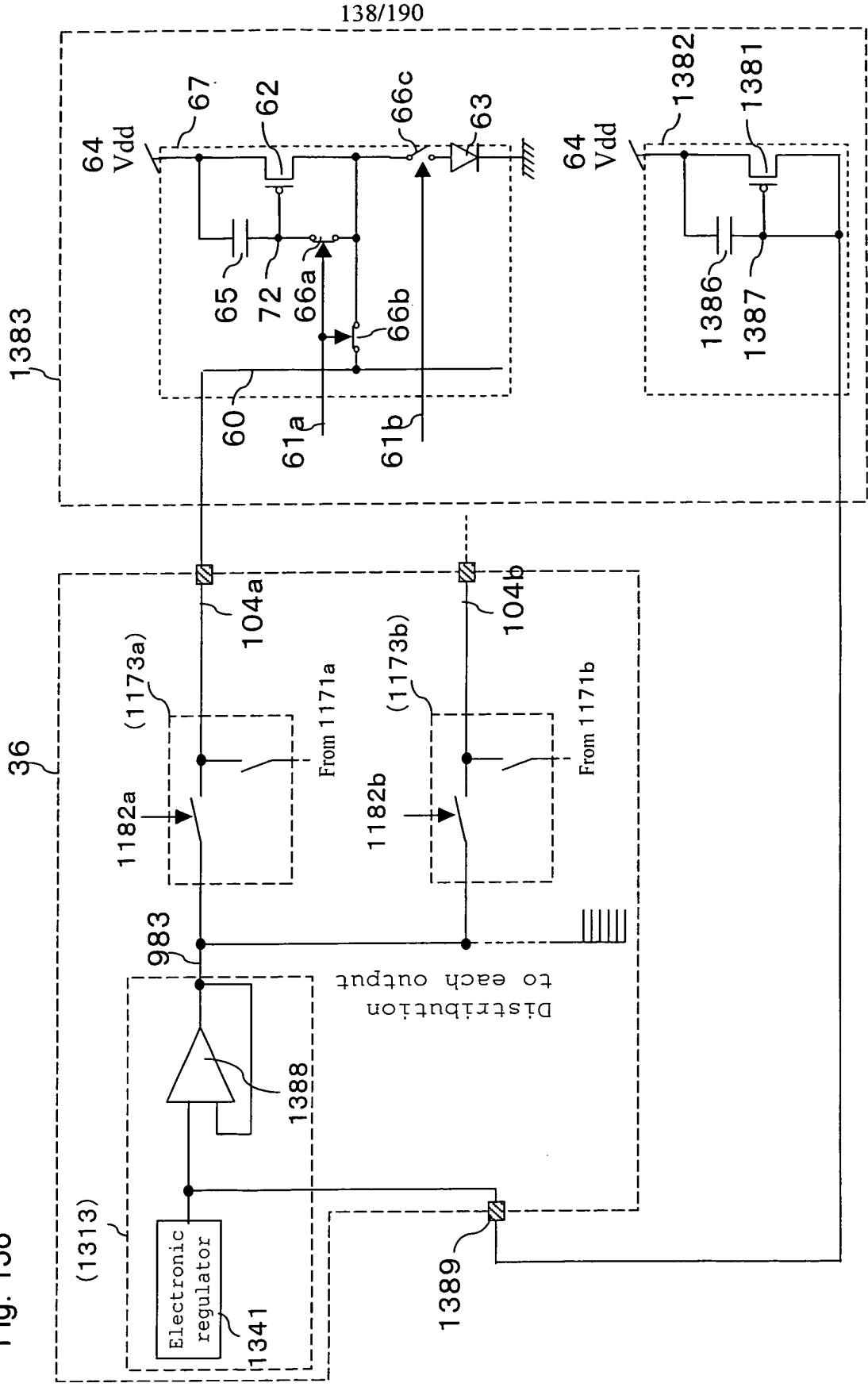


Fig. 137

Fig. 138



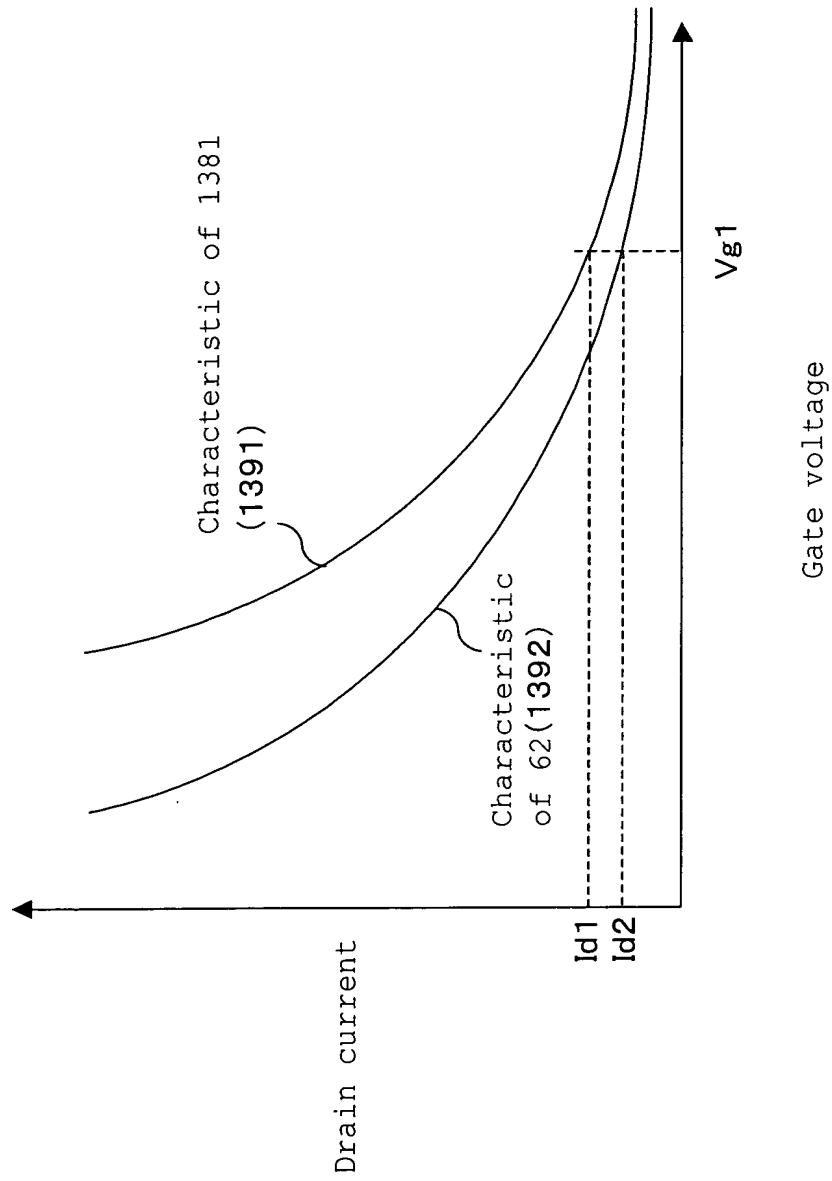


Fig. 139

Fig. 140

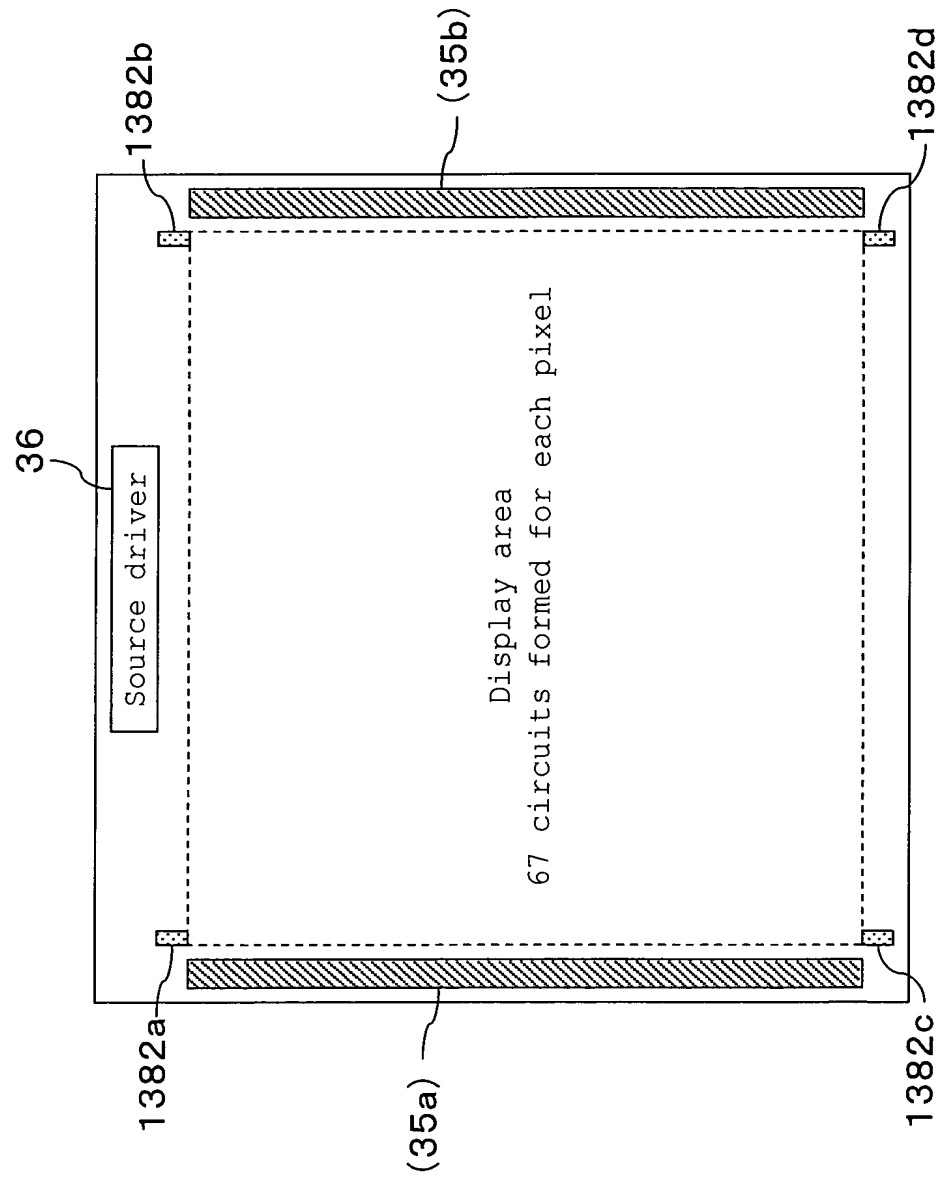


Fig. 141

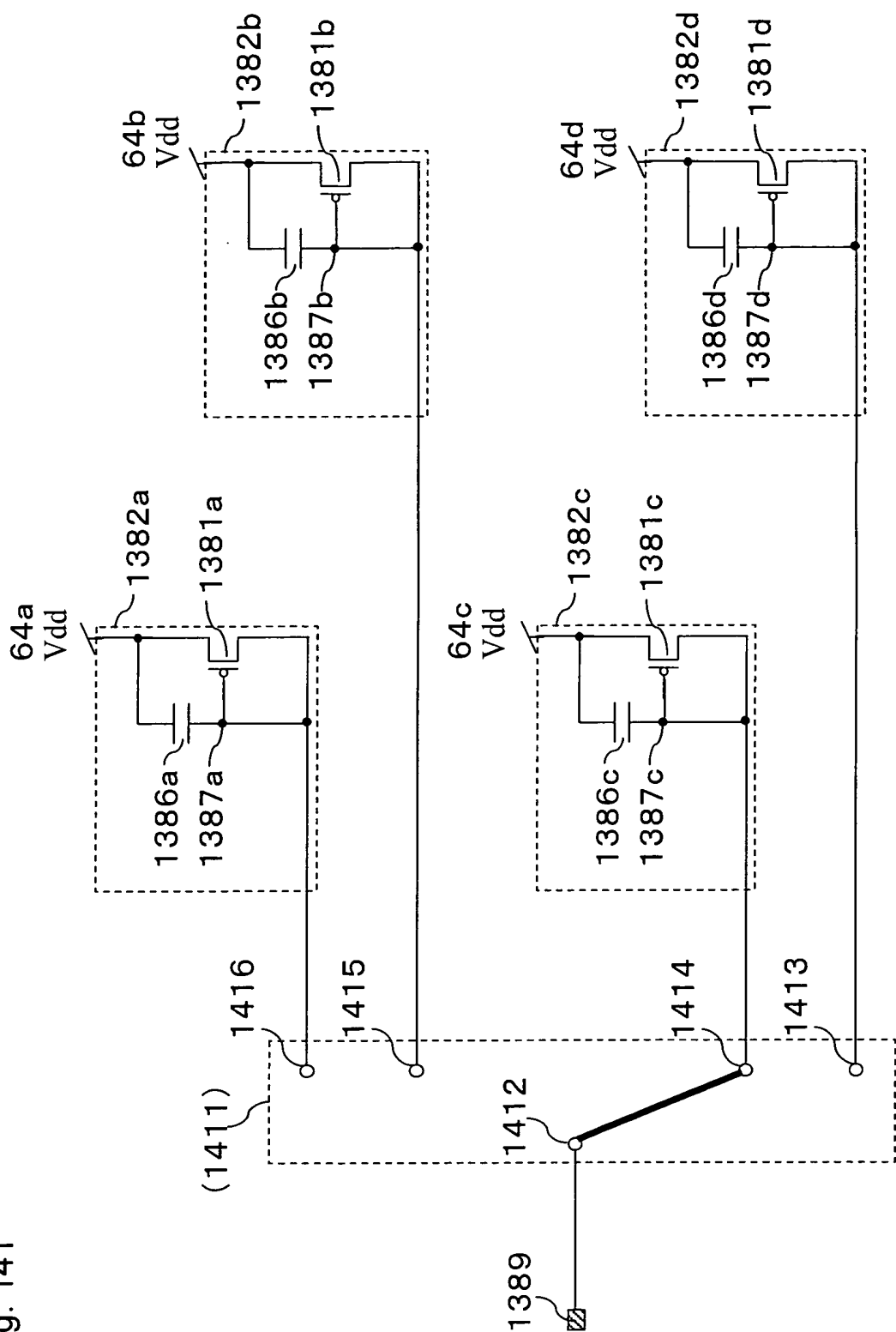
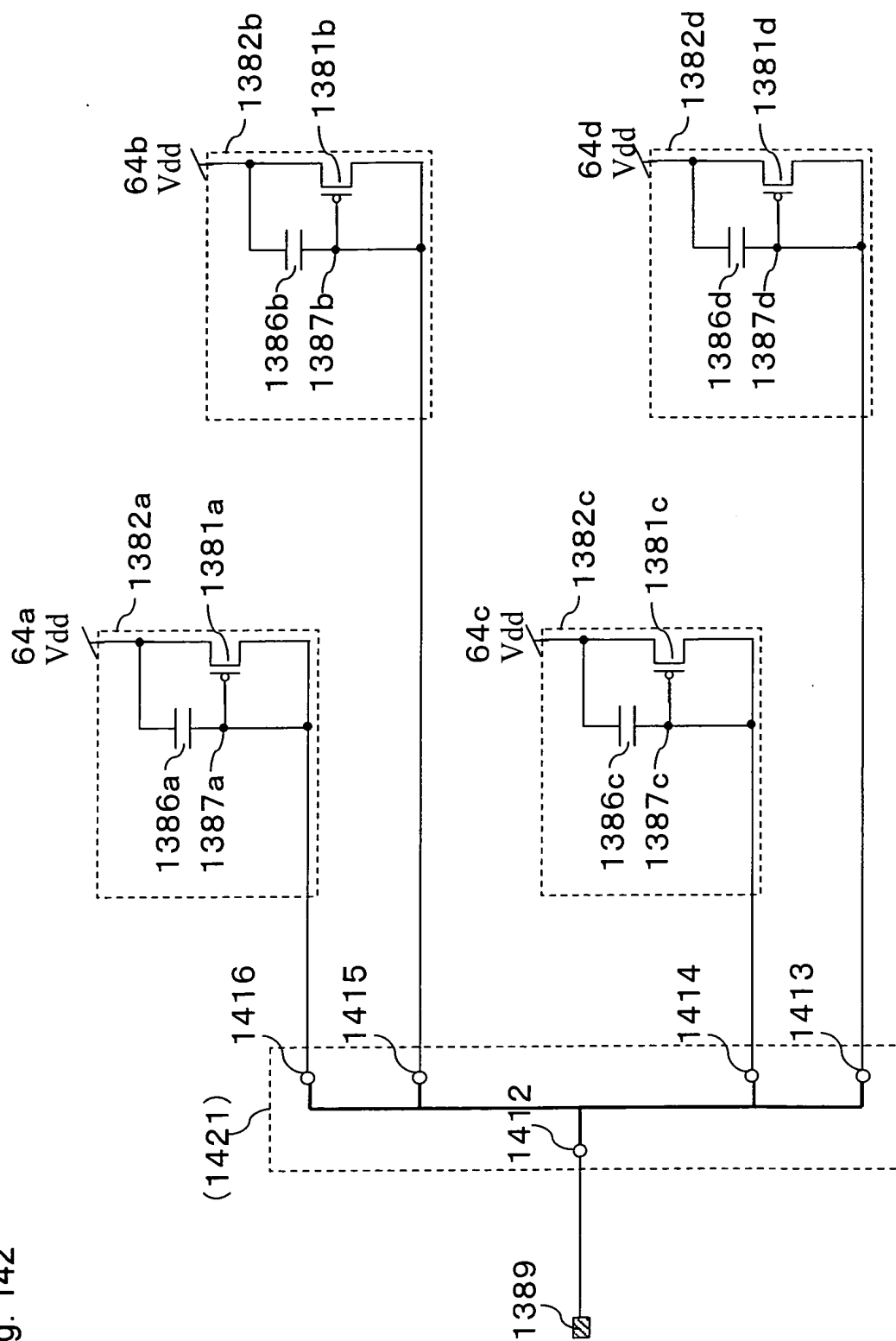


Fig. 142



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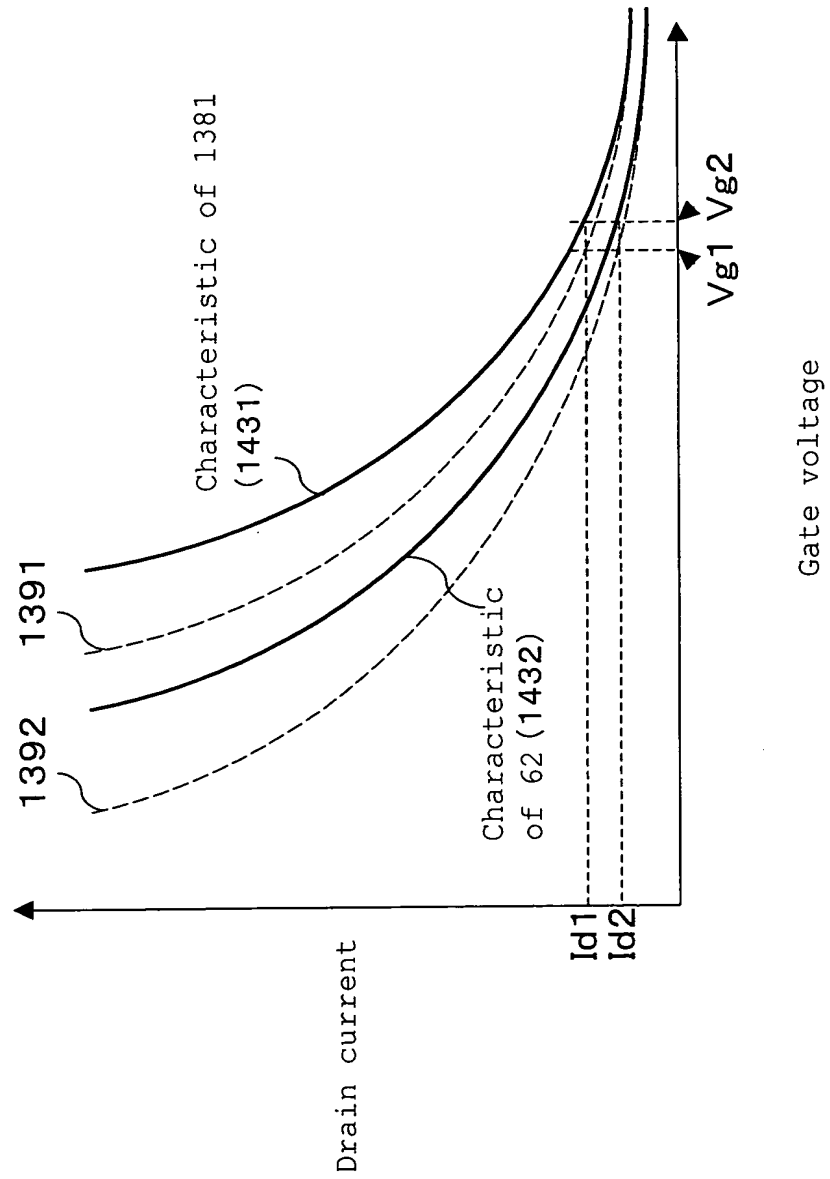
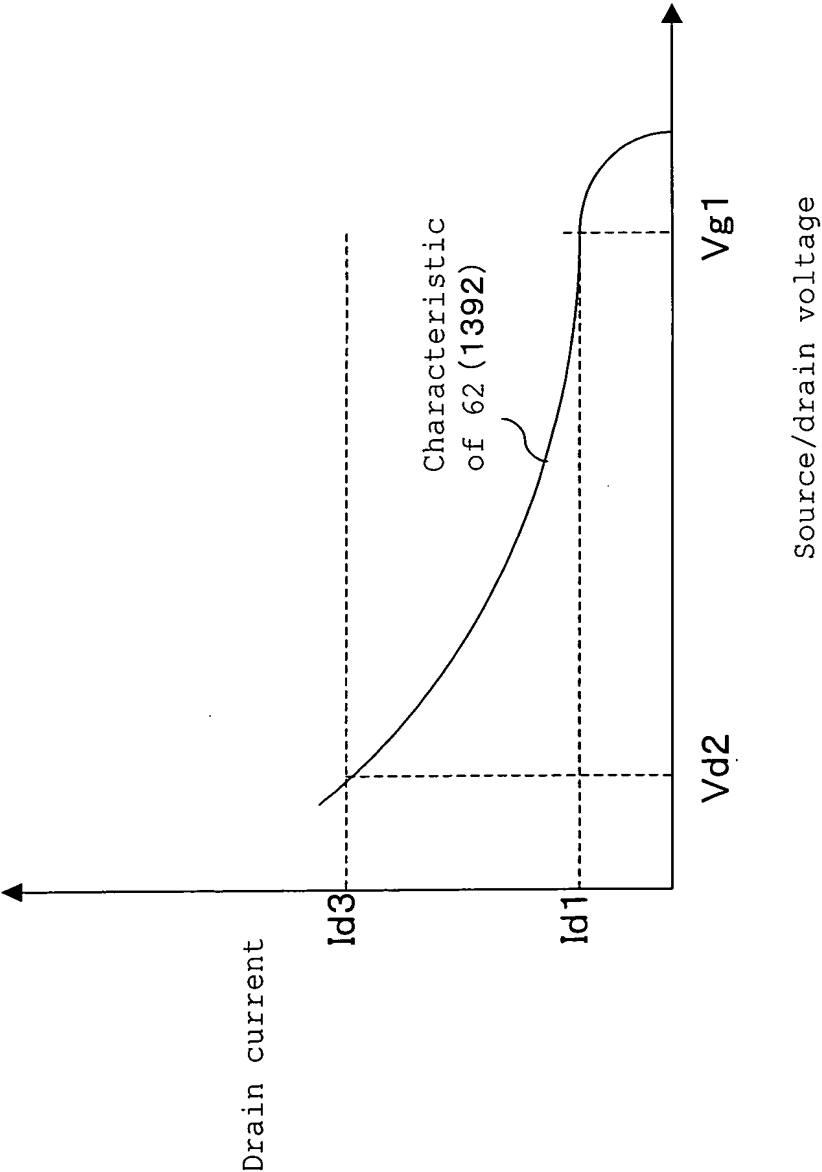


Fig. 143

Fig. 144



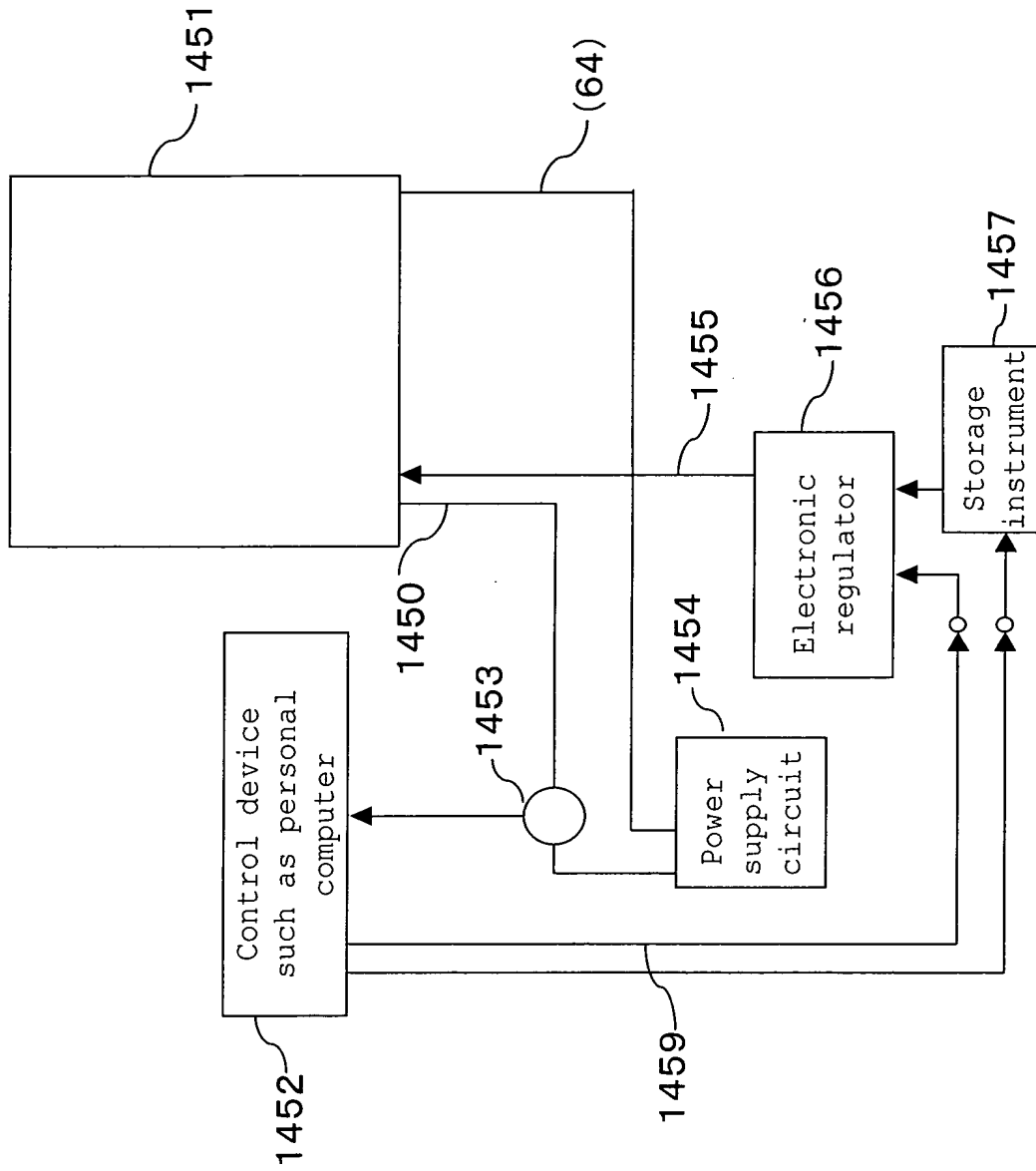
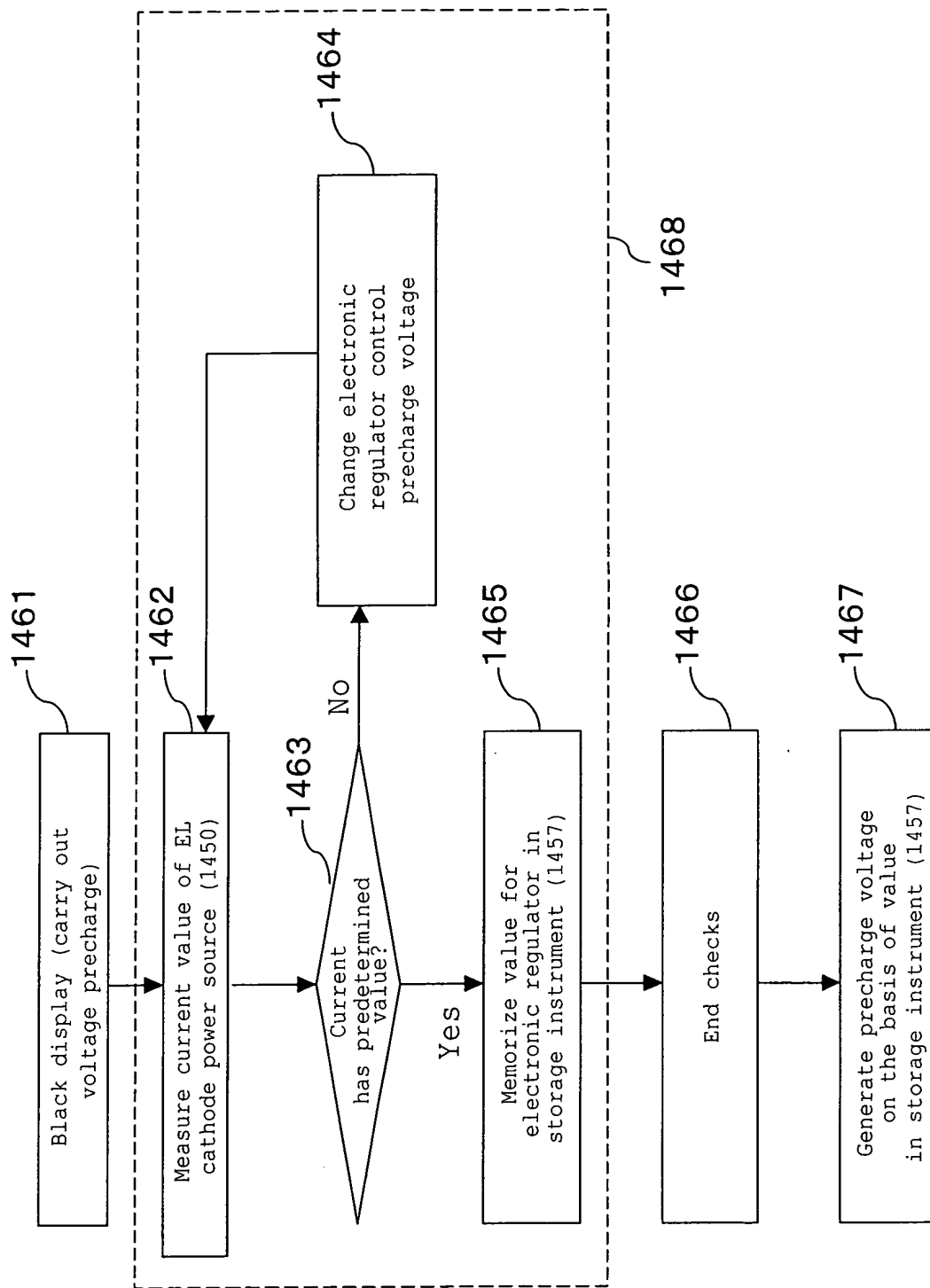


Fig. 145

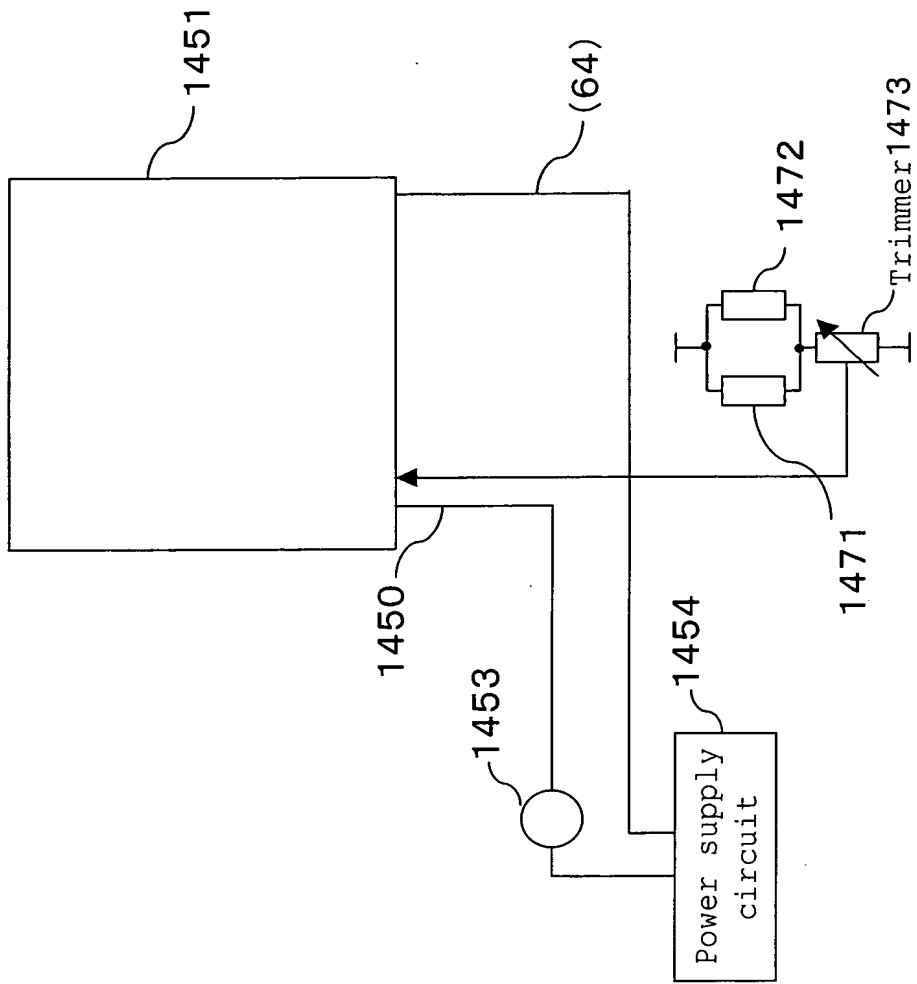
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Fig. 146



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Fig. 147



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Fig. 148

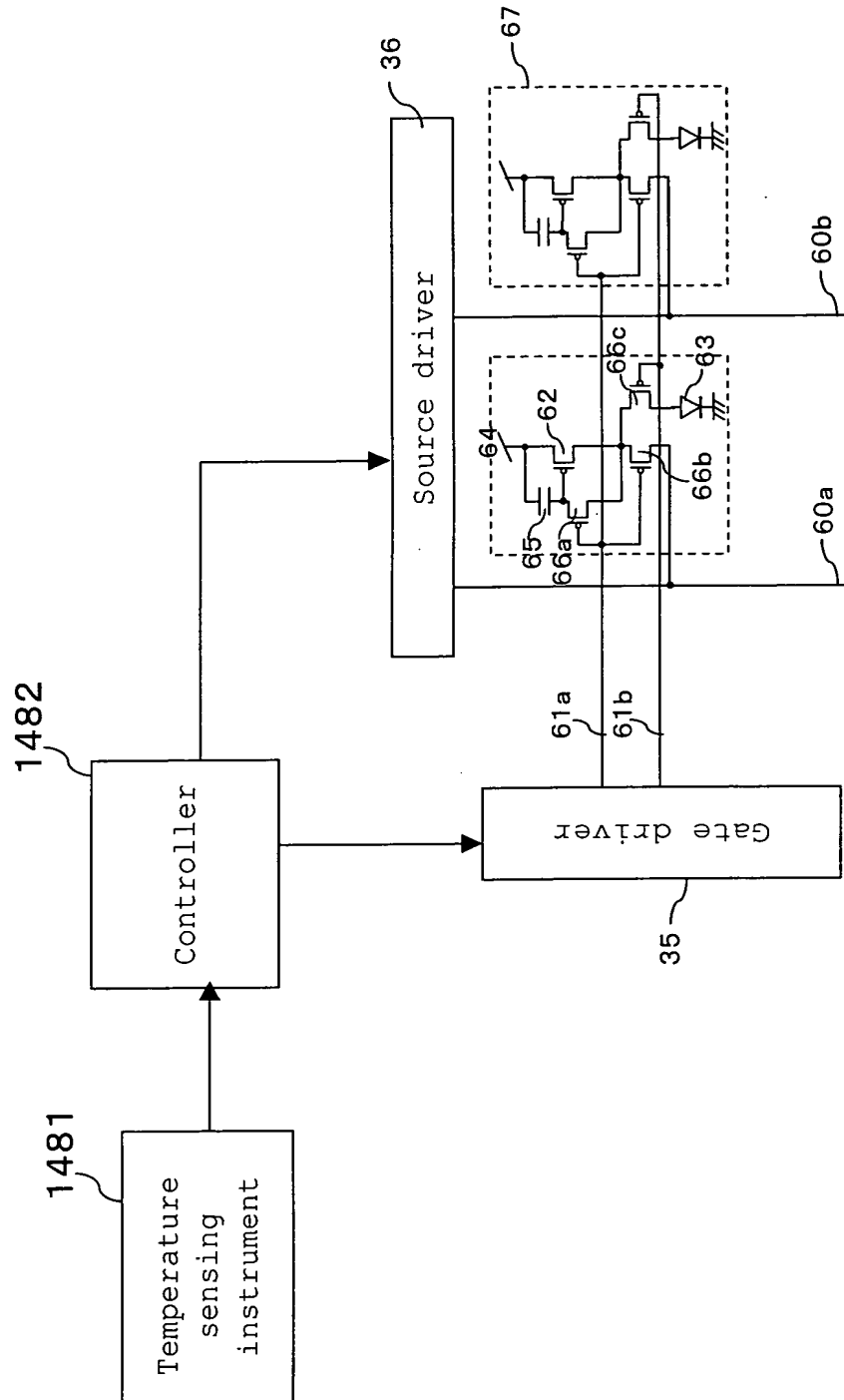


Fig. 149 (a)

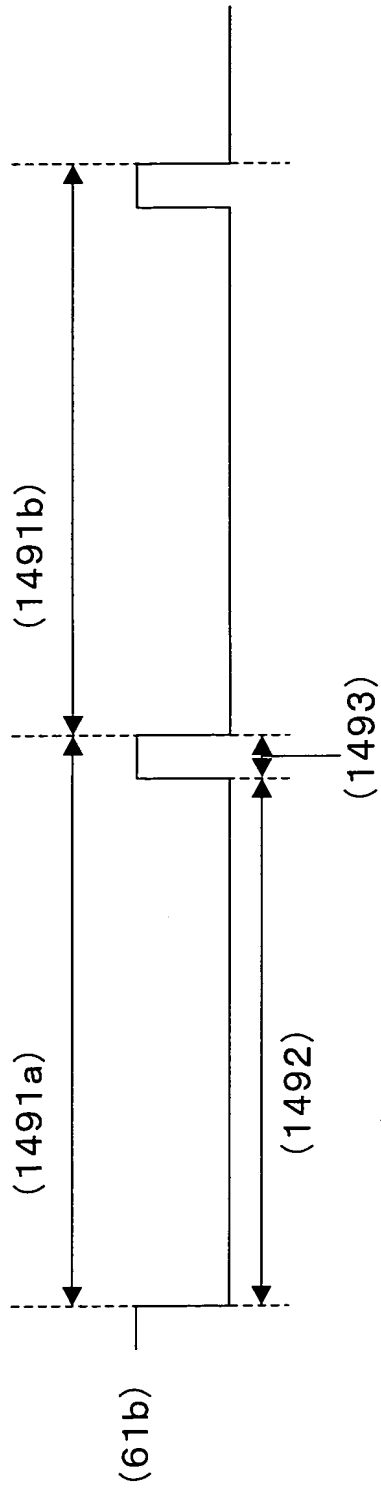
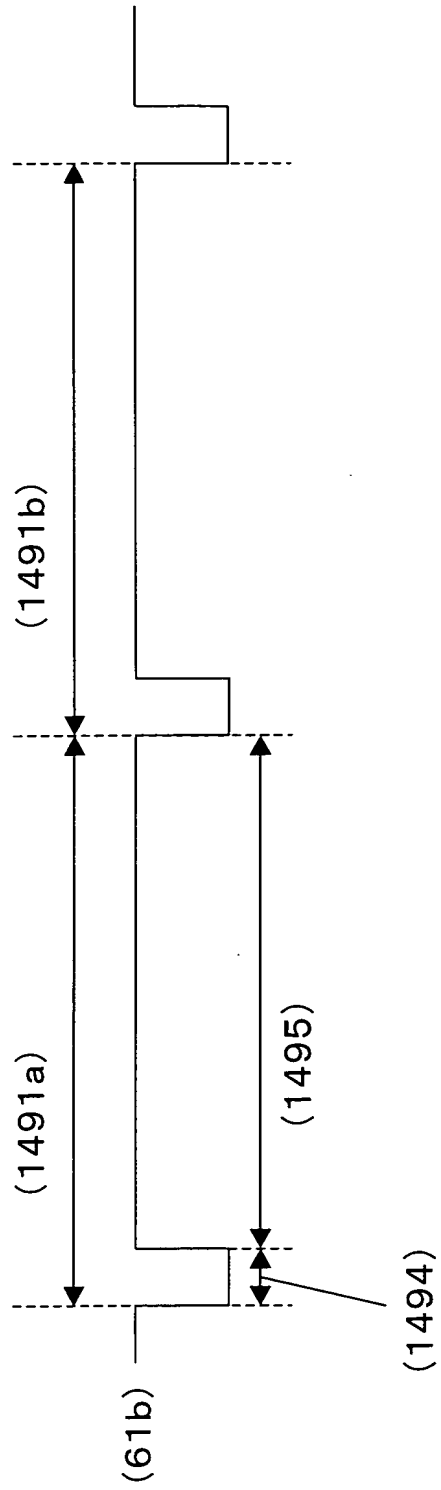
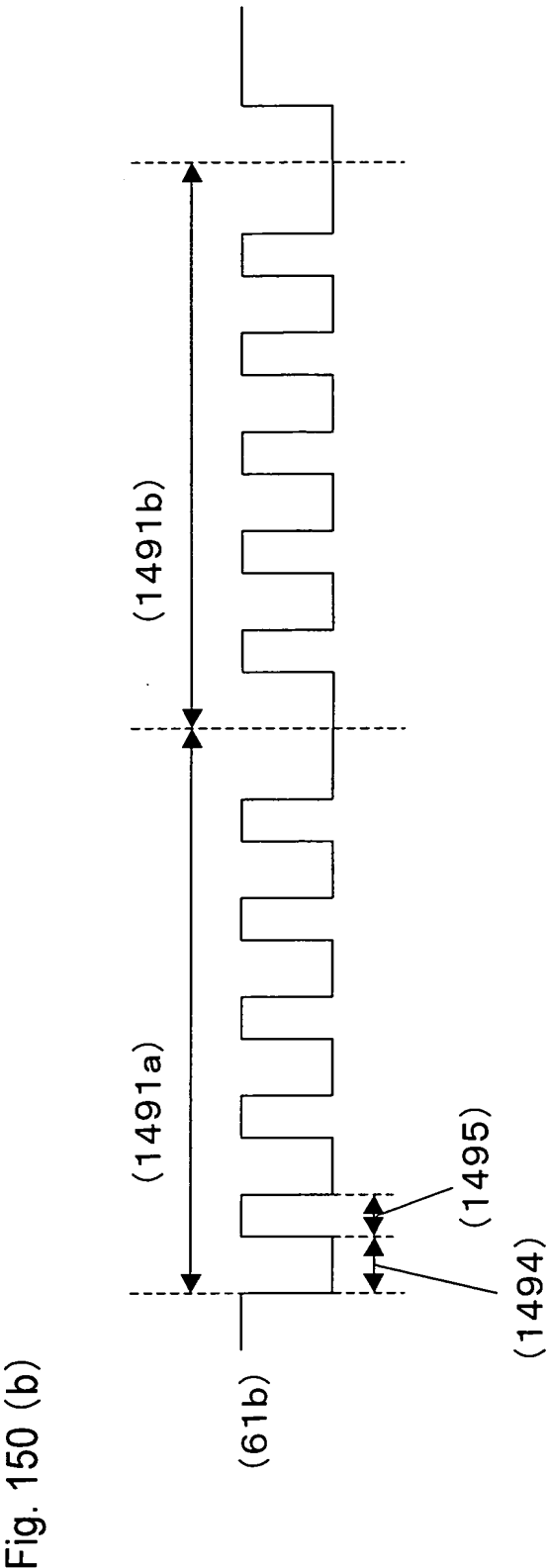
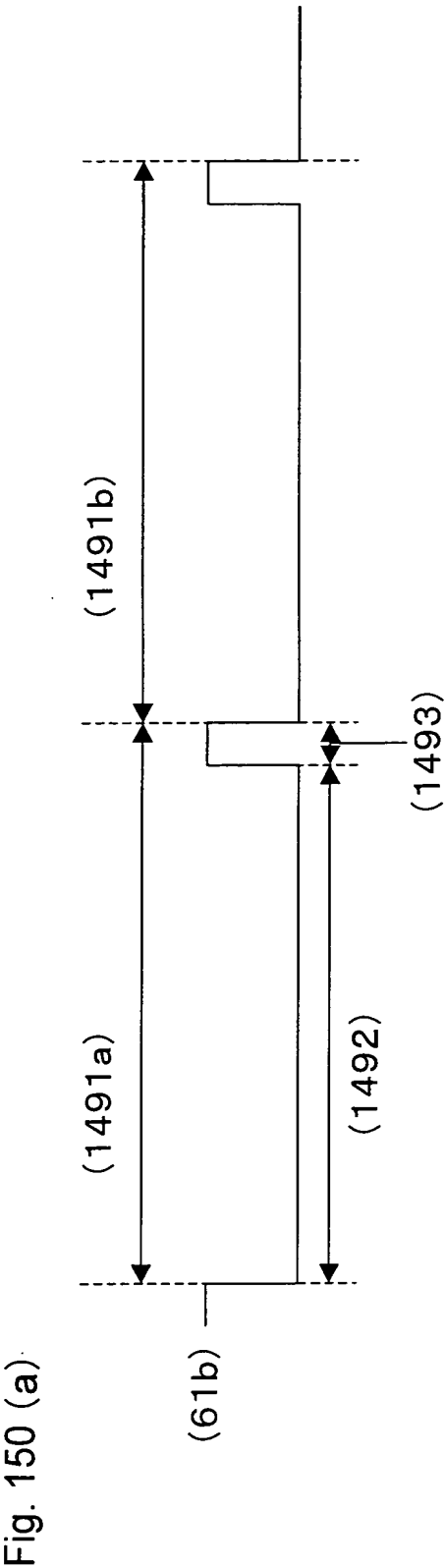


Fig. 149 (b)





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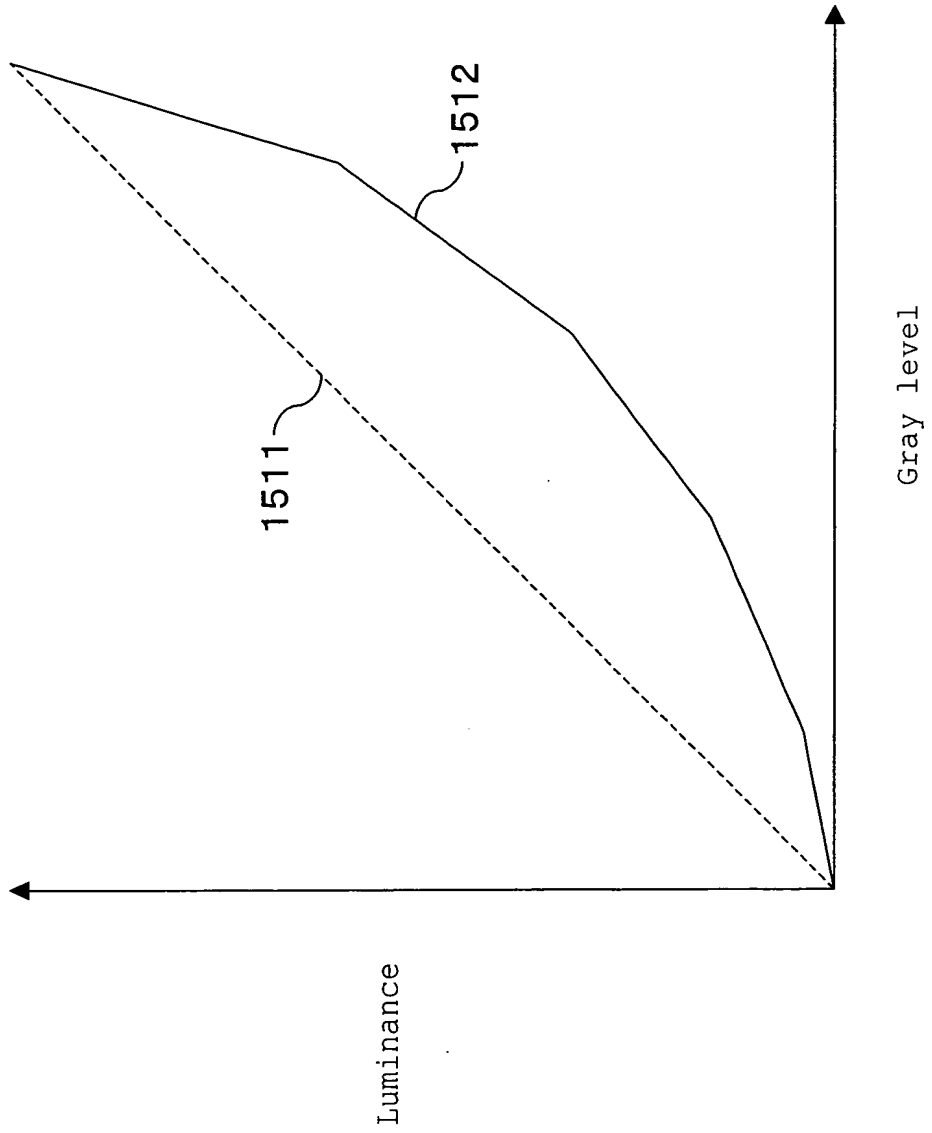
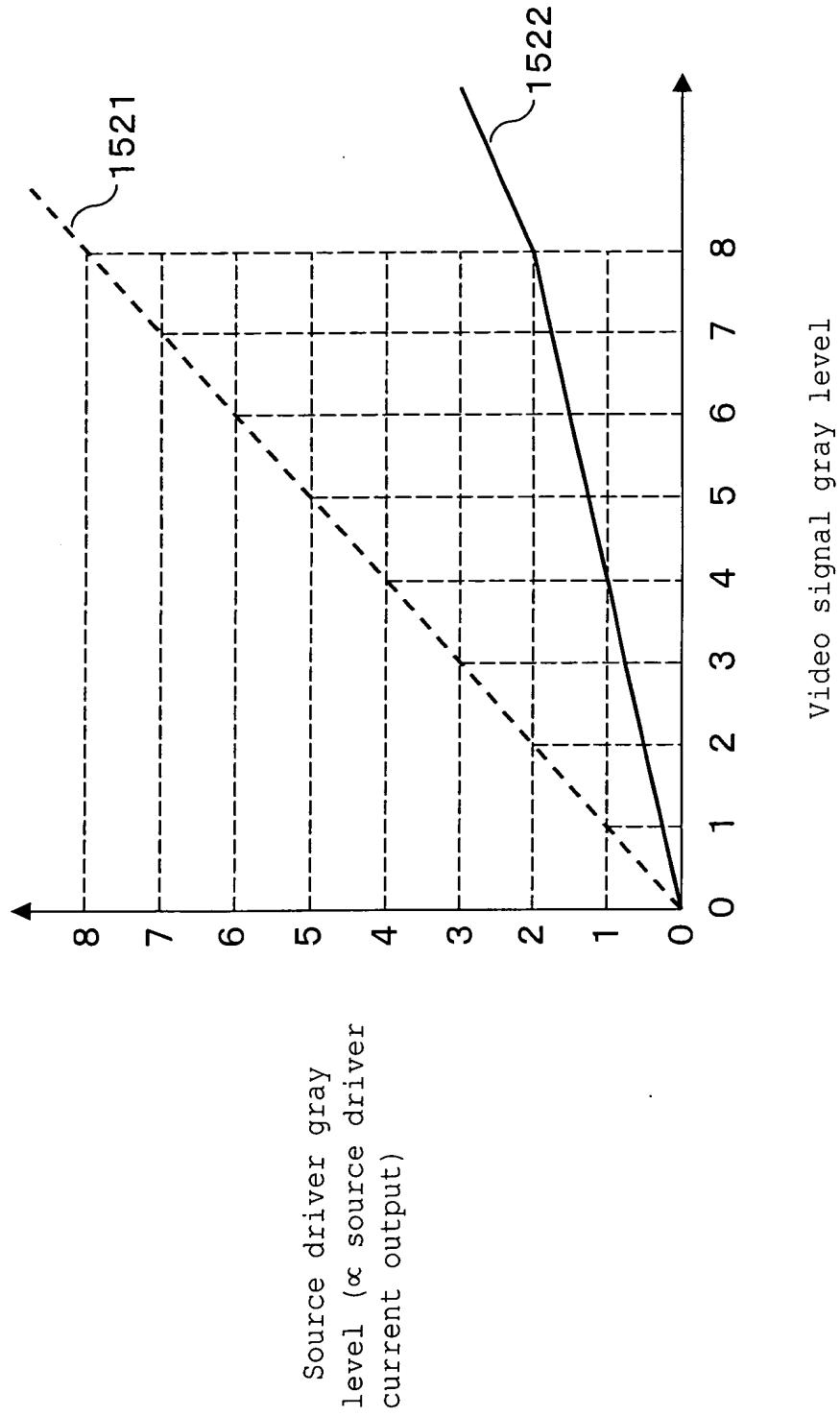


Fig. 151

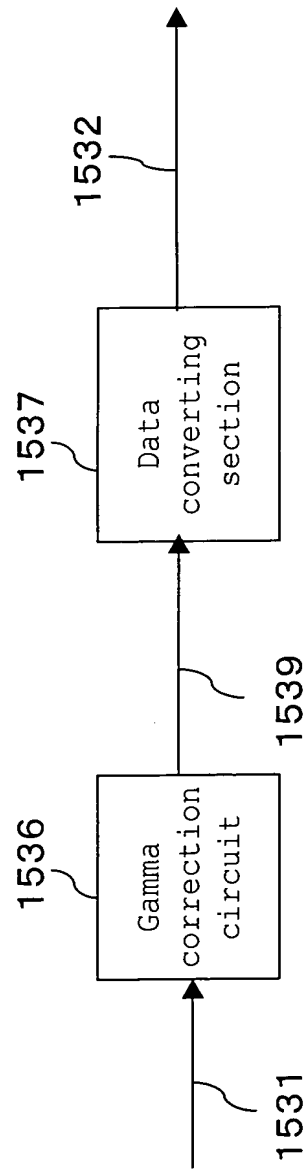
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Fig. 152



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Fig. 153



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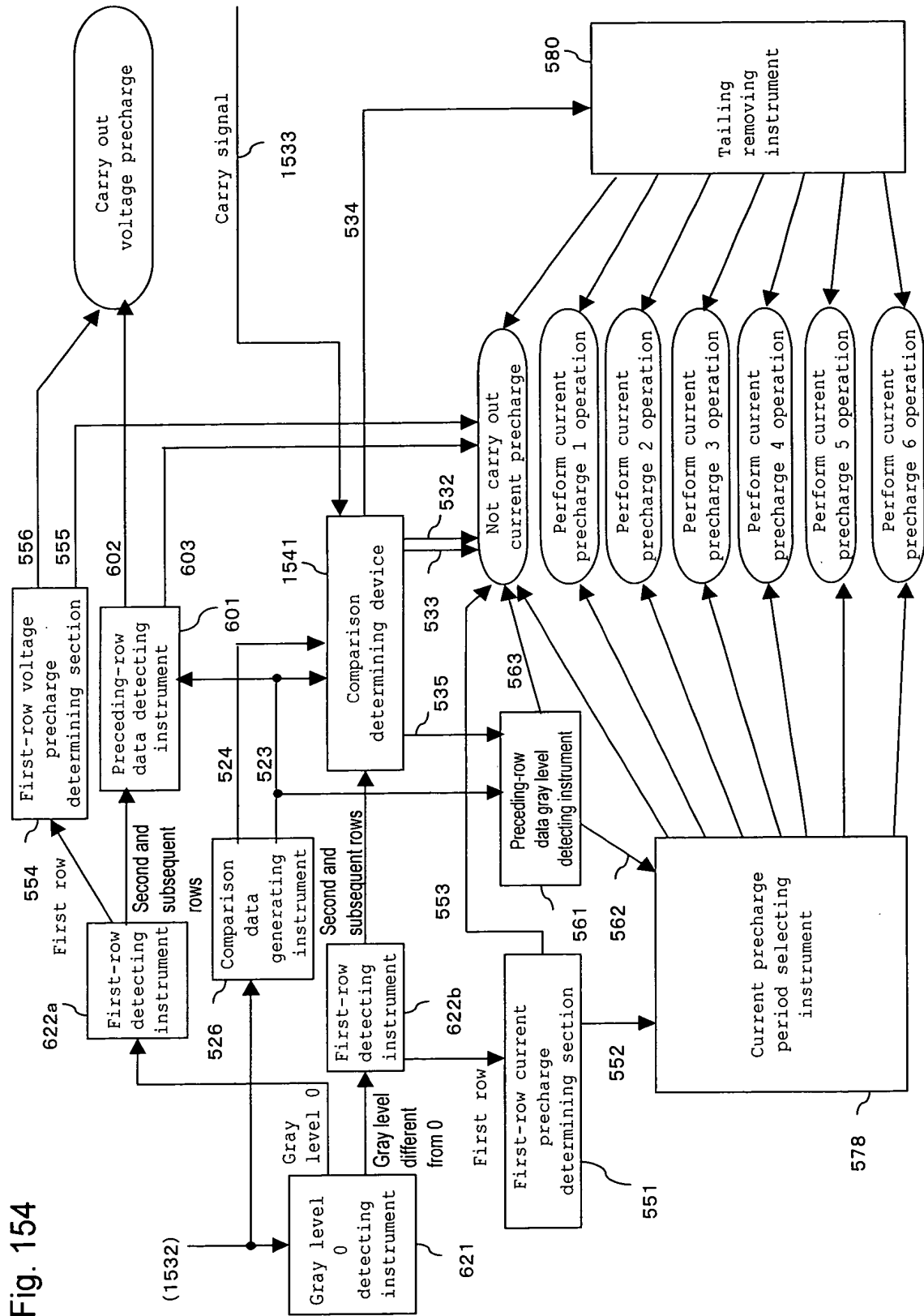
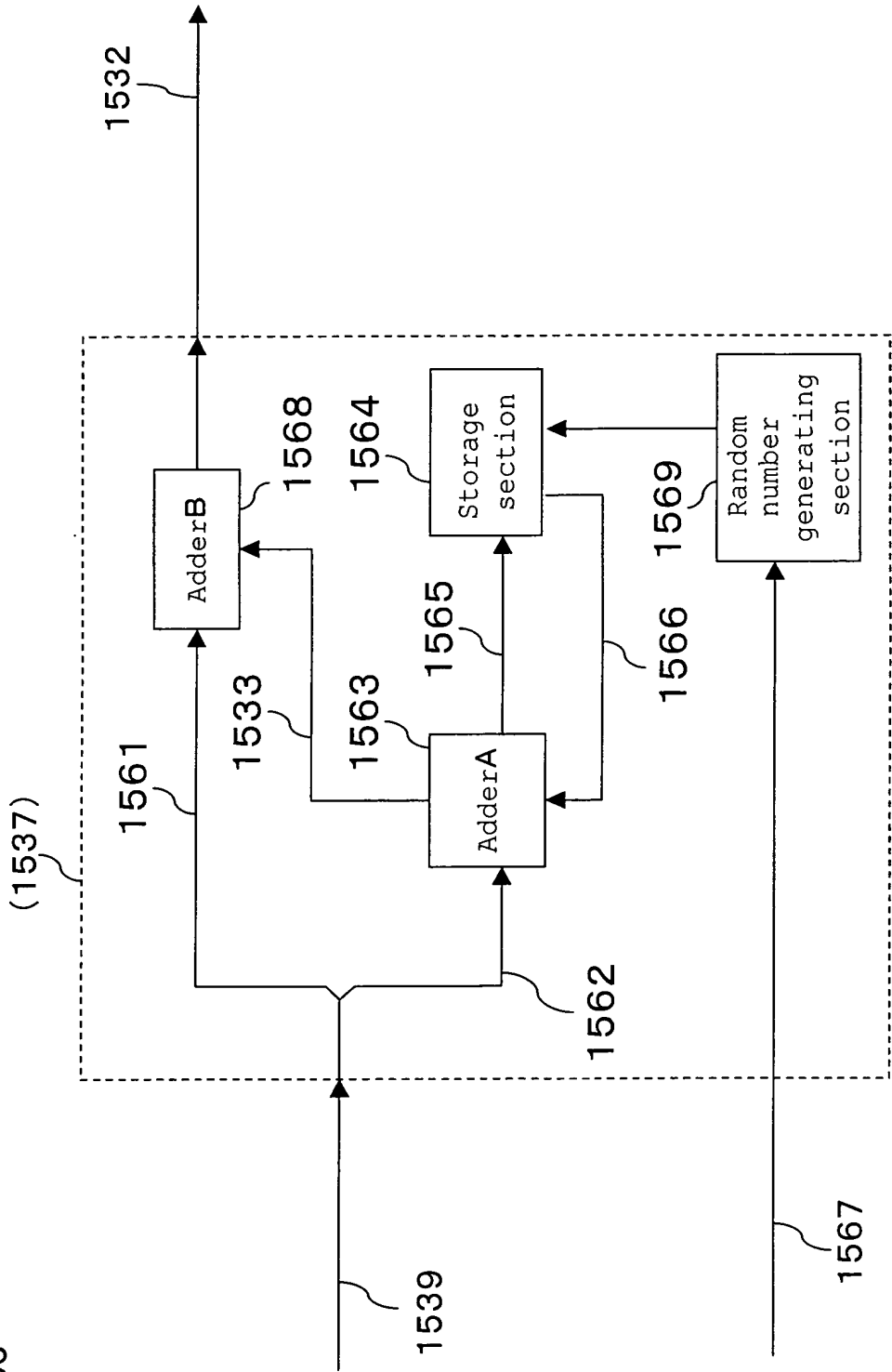


Fig. 155

1553	1554	1555	1556	1557	(1552a)	(1552b)	(1552c)	(1552d)	(1552e)	(1552f)	(1552g)	(1552h)
					0	0	0	1	0	0	0	1
					0	1	0	0	0	1	0	0
					0	0	1	0	0	0	1	0
					(1551a)	(1551b)	(1551c)	(1551d)				

Fig. 156



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Fig. 157

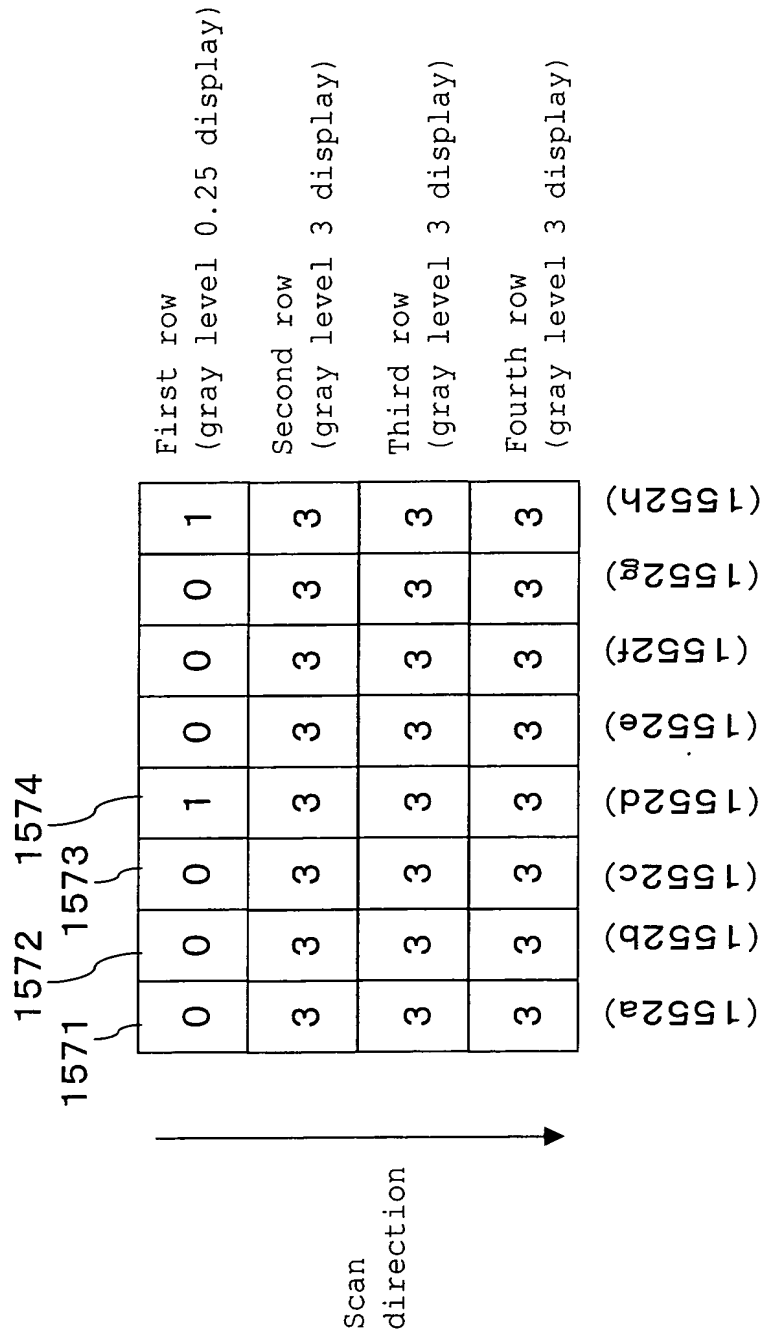


Fig. 158

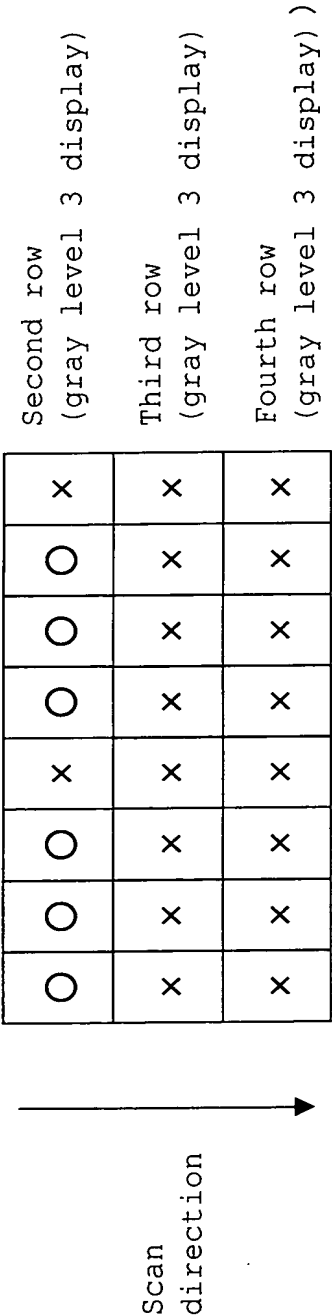


Fig. 159

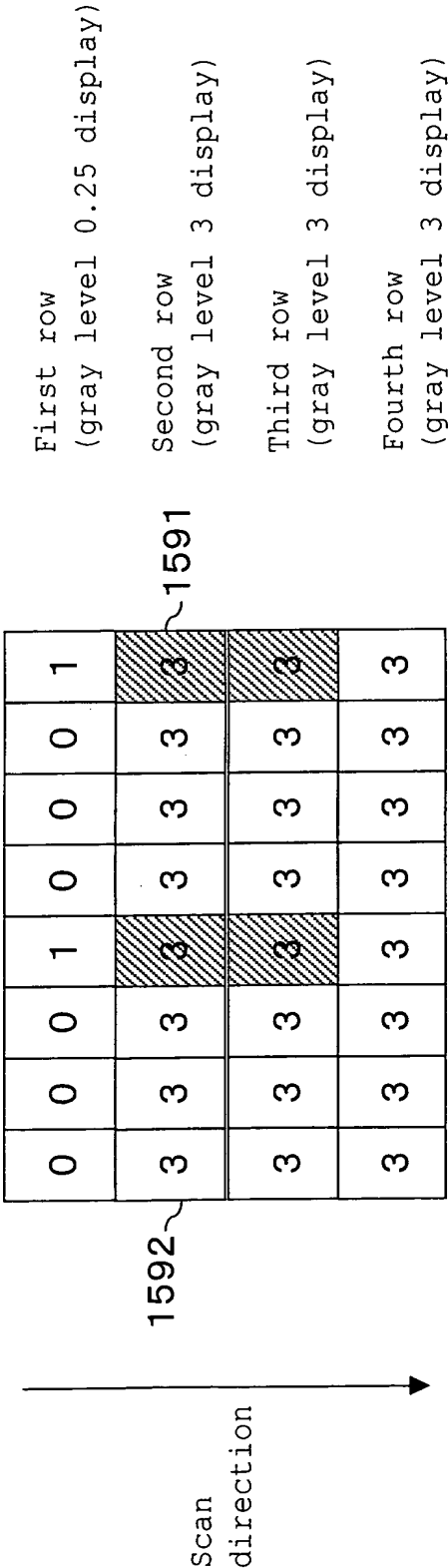
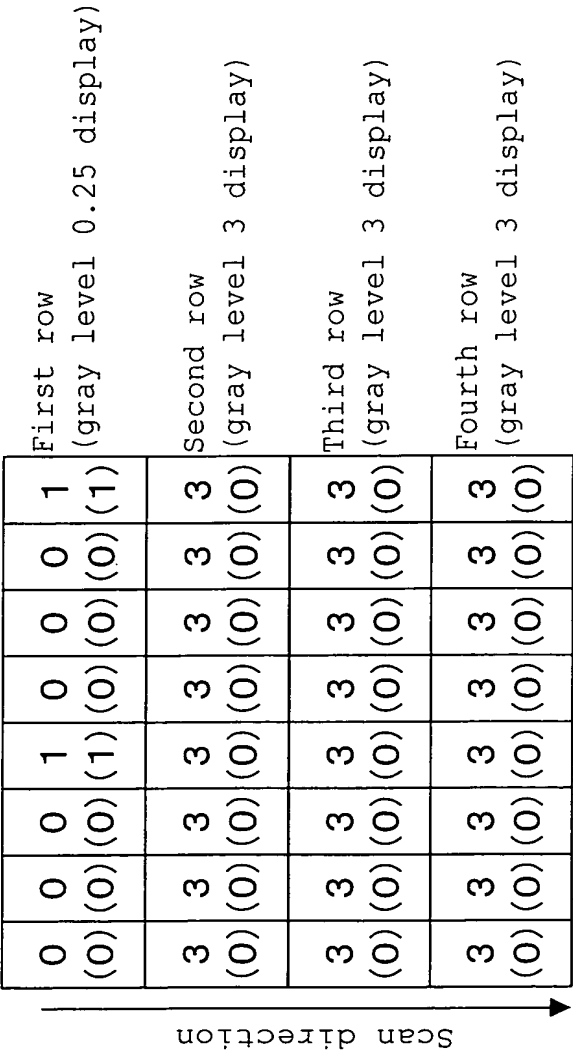


Fig. 160(b)

Fig. 160 (a)



O	O	O	O	O	O	O	O
x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x

Fig. 161

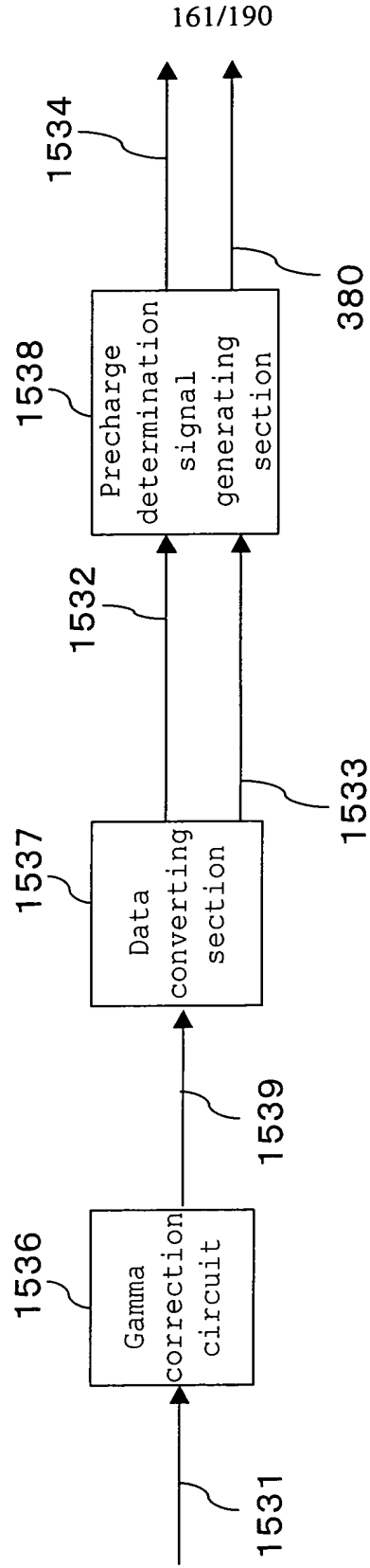


Fig. 162

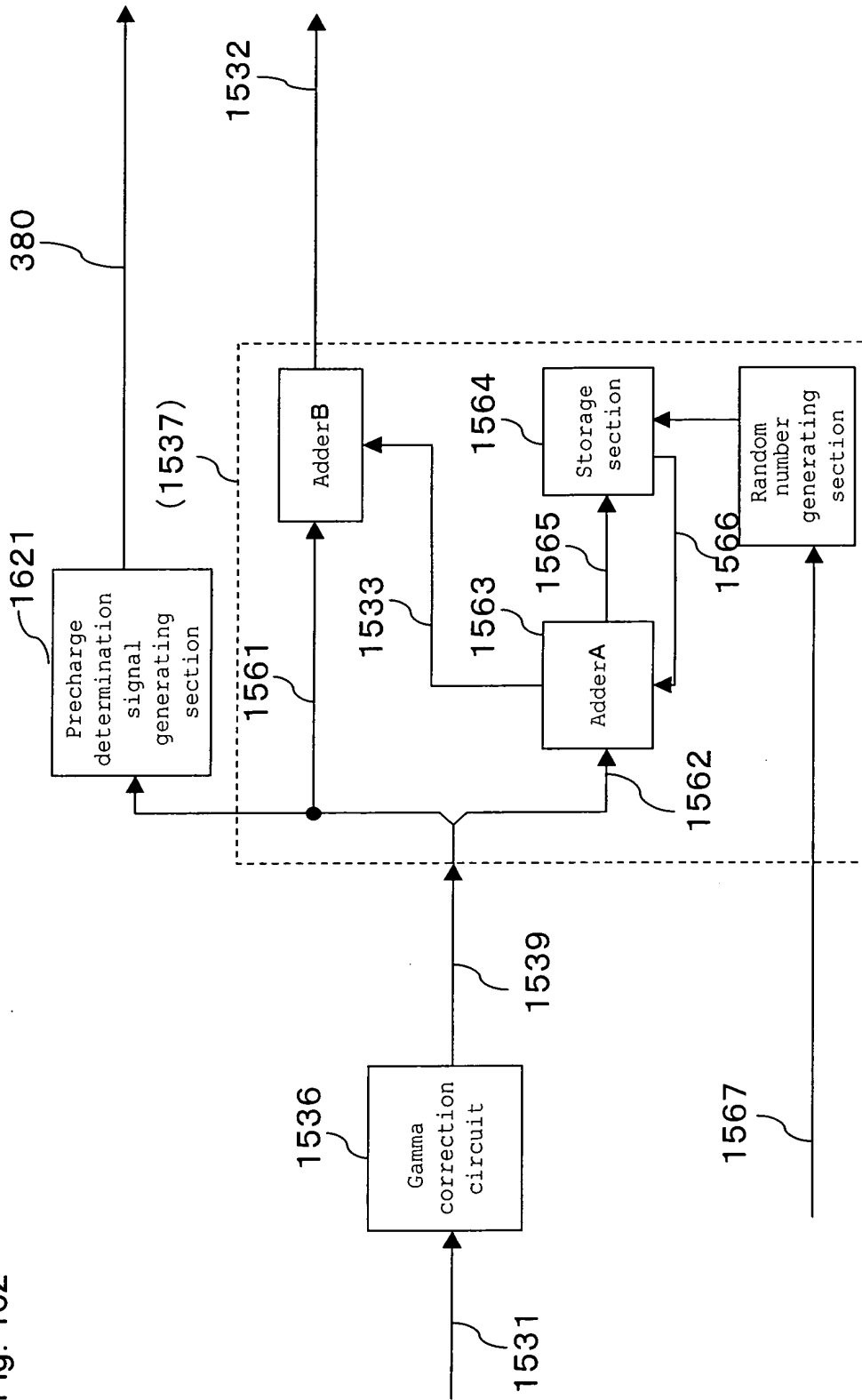


Fig. 164

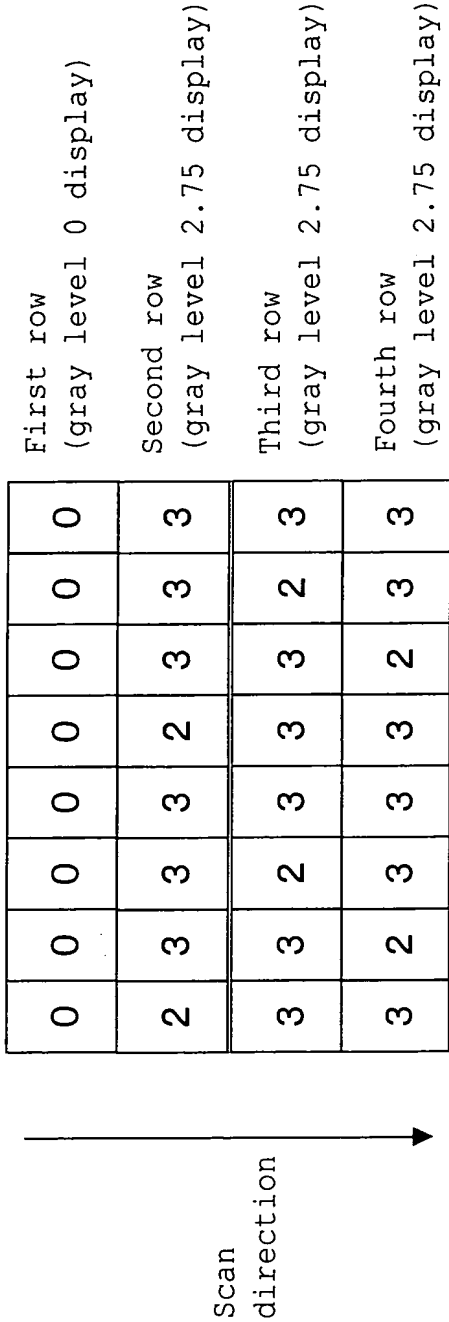


Fig. 165

Scan
direction

0	0	0	0	0	0	0	0	First row (gray level 0 display)
2	2	2	2	2	2	2	2	Second row (gray level 2.75 display)
2	2	2	2	2	2	2	2	Third row (gray level 2.75 display)
2	2	2	2	2	2	2	2	Fourth row (gray level 2.75 display)

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Fig. 166

Carry signal for preceding row (1533)	Current carry signal(1533)	Determination
0	0	Not carry out precharge
0	1	Not carry out precharge
1	0	Carry out precharge
1	1	Not carry out precharge

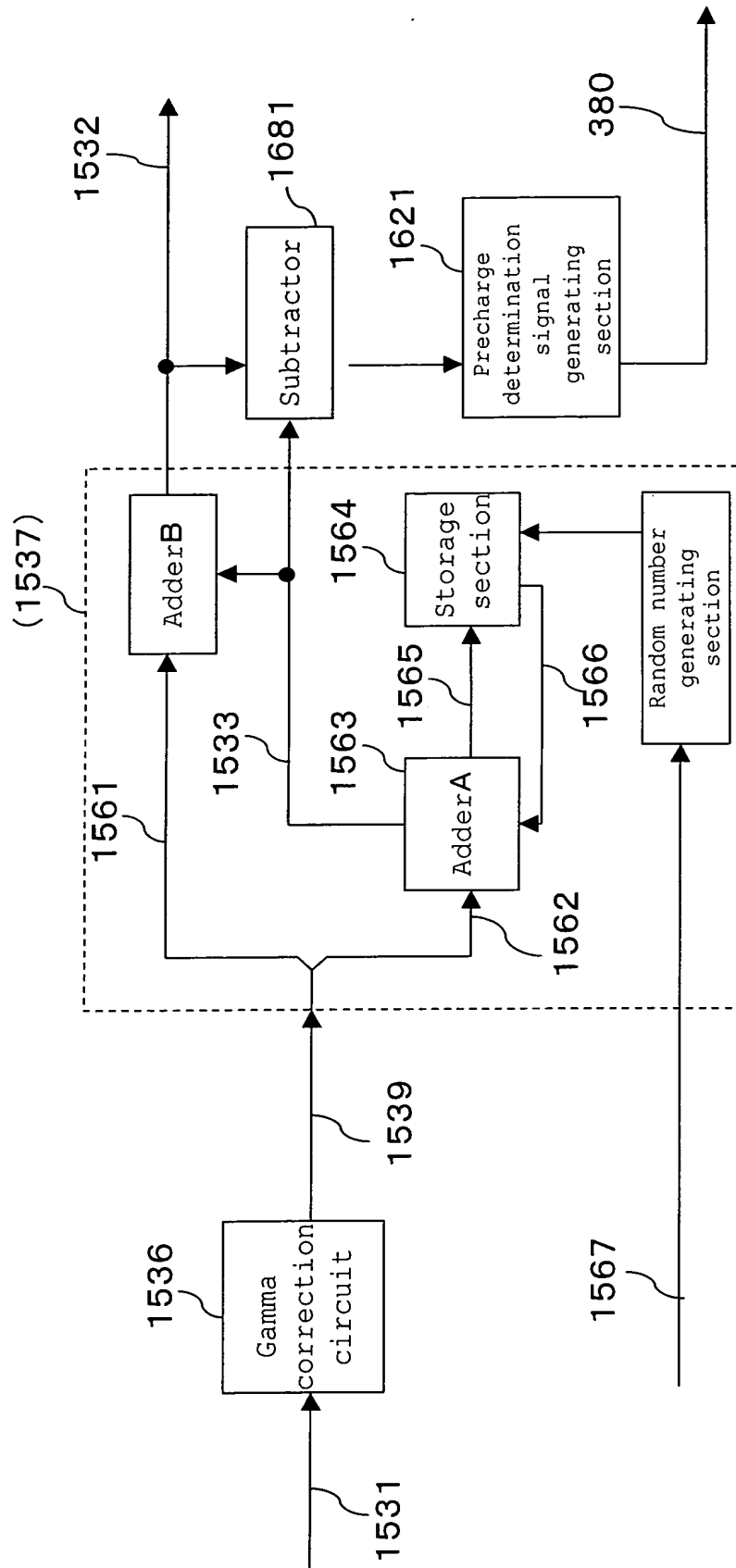
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Fig. 167

Carry signal for preceding row (1533)	Current carry signal (1533)	Determination
0	0	Carry out precharge
0	1	Not carry out precharge
1	0	Carry out precharge
1	1	Carry out precharge

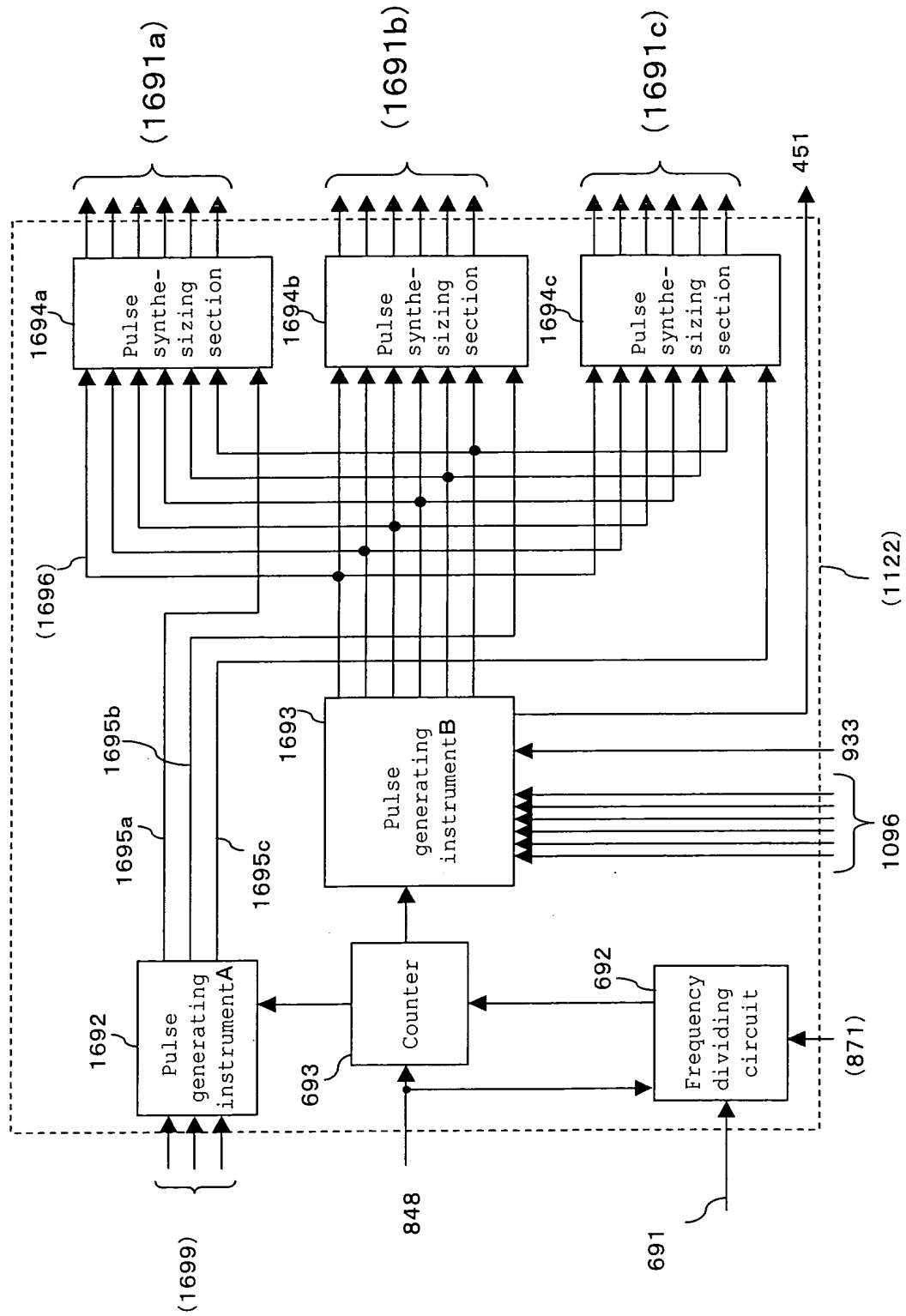
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Fig. 168



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Fig. 169



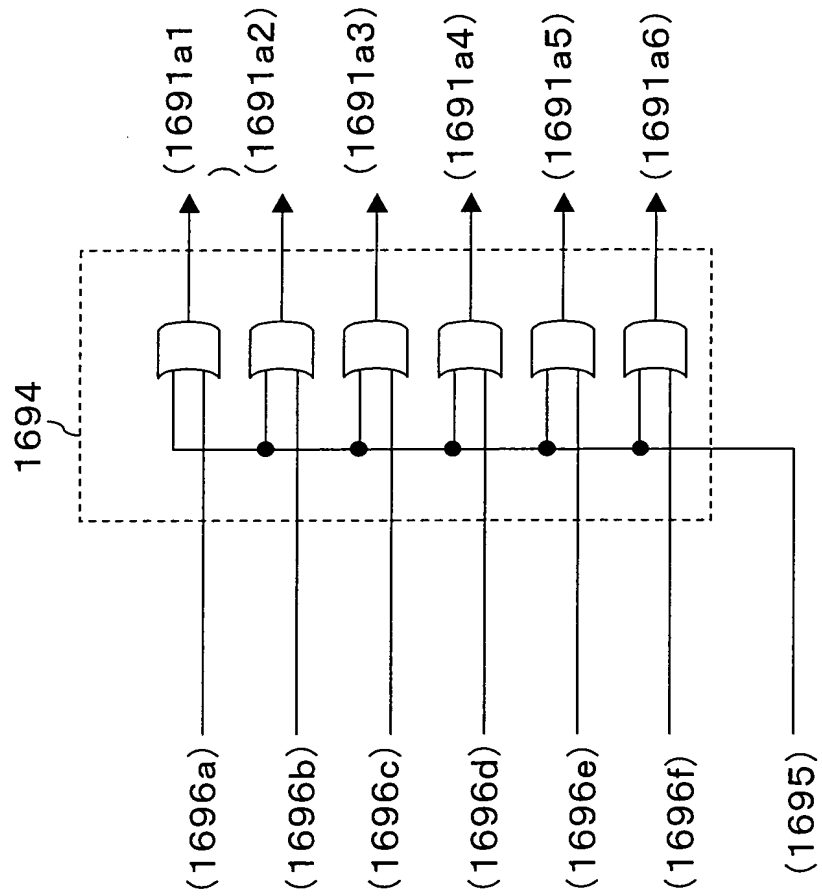


Fig. 170

Fig. 171

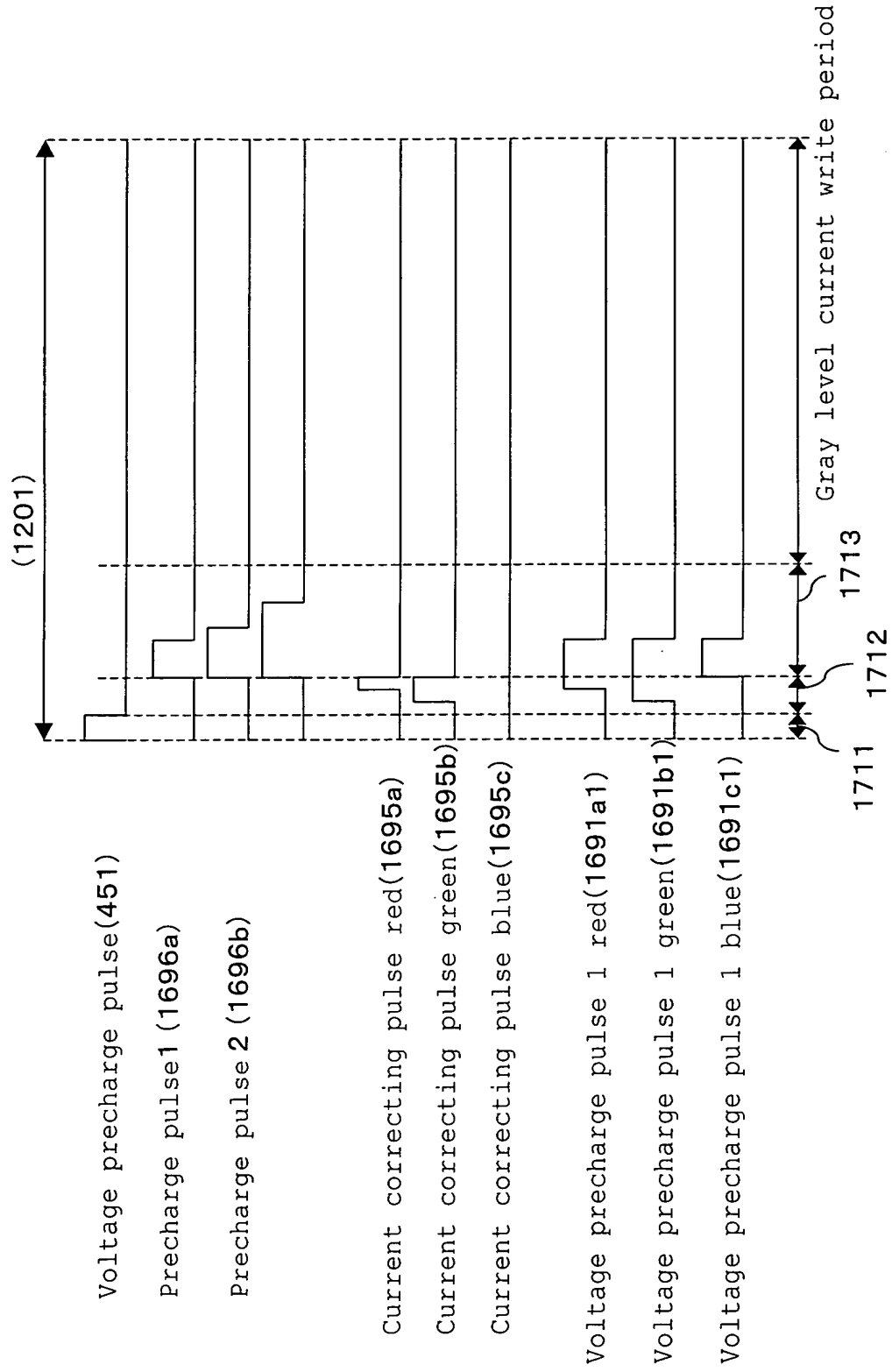
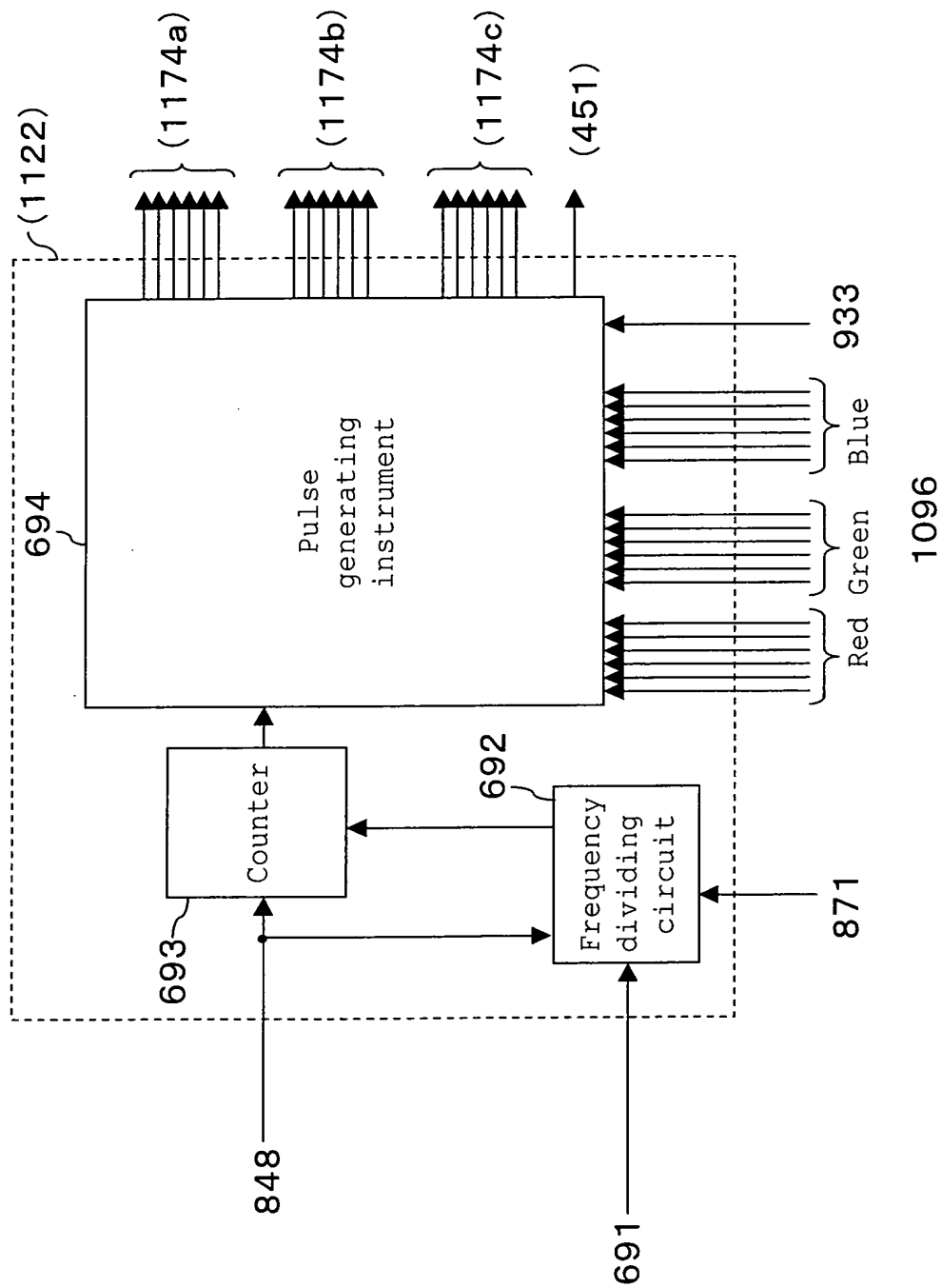
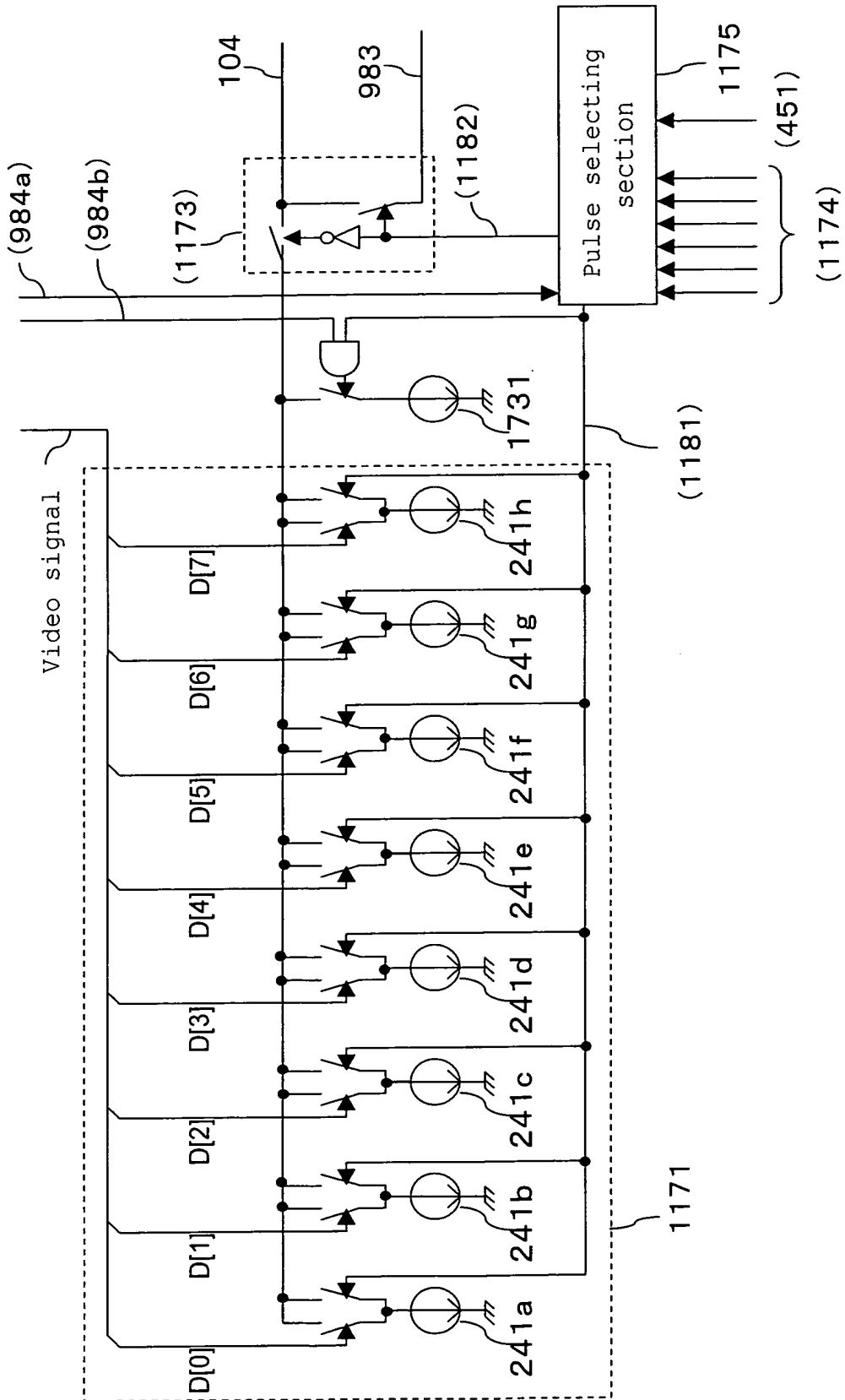


Fig. 172



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Fig. 173



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Fig. 174

Precharge determination line			Operation	
984b	984a		Voltage precharge	Current precharge (current value, period)
X	0	0	Not carry out	Not carry out
0	0	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174a
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174a
0	0	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174b
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174b
0	0	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174c
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174c
0	1	0	carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174c
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174d
0	1	0	carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174d
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174d
0	1	0	carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174e
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174e
0	1	1	carry out	Current sources 241a to 241h used to carry out precharge during input of pulse 1174f
1			carry out	Current sources 241a to 241h and 1731 used to carry out precharge during input of pulse 1174f
X	1	1	carry out	Not carry out

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Fig. 175 (a)

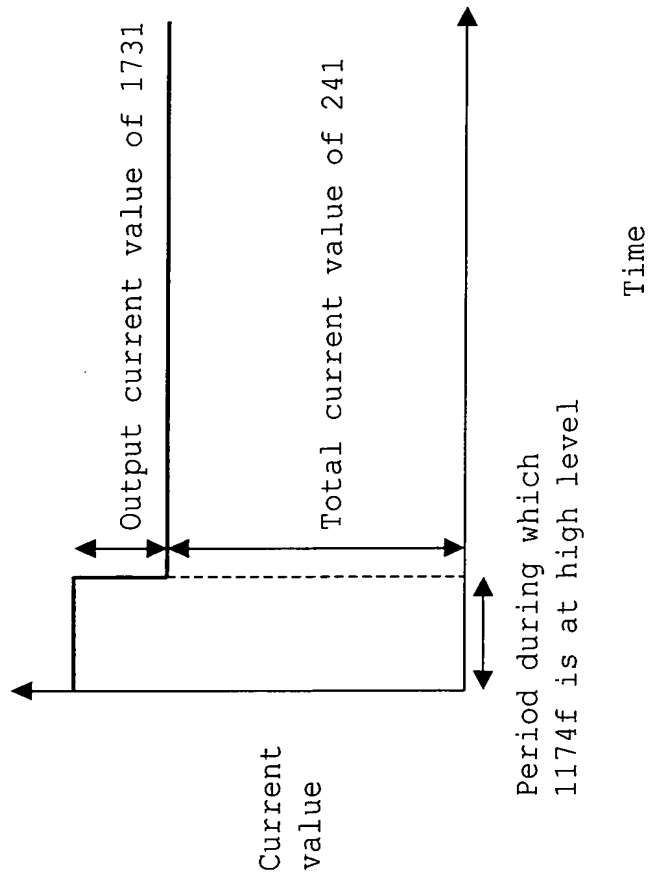


Fig. 175(b)

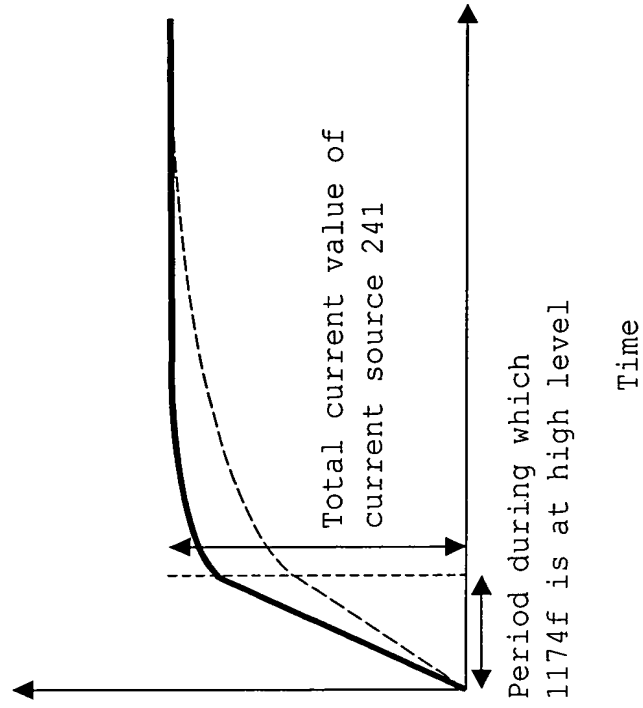
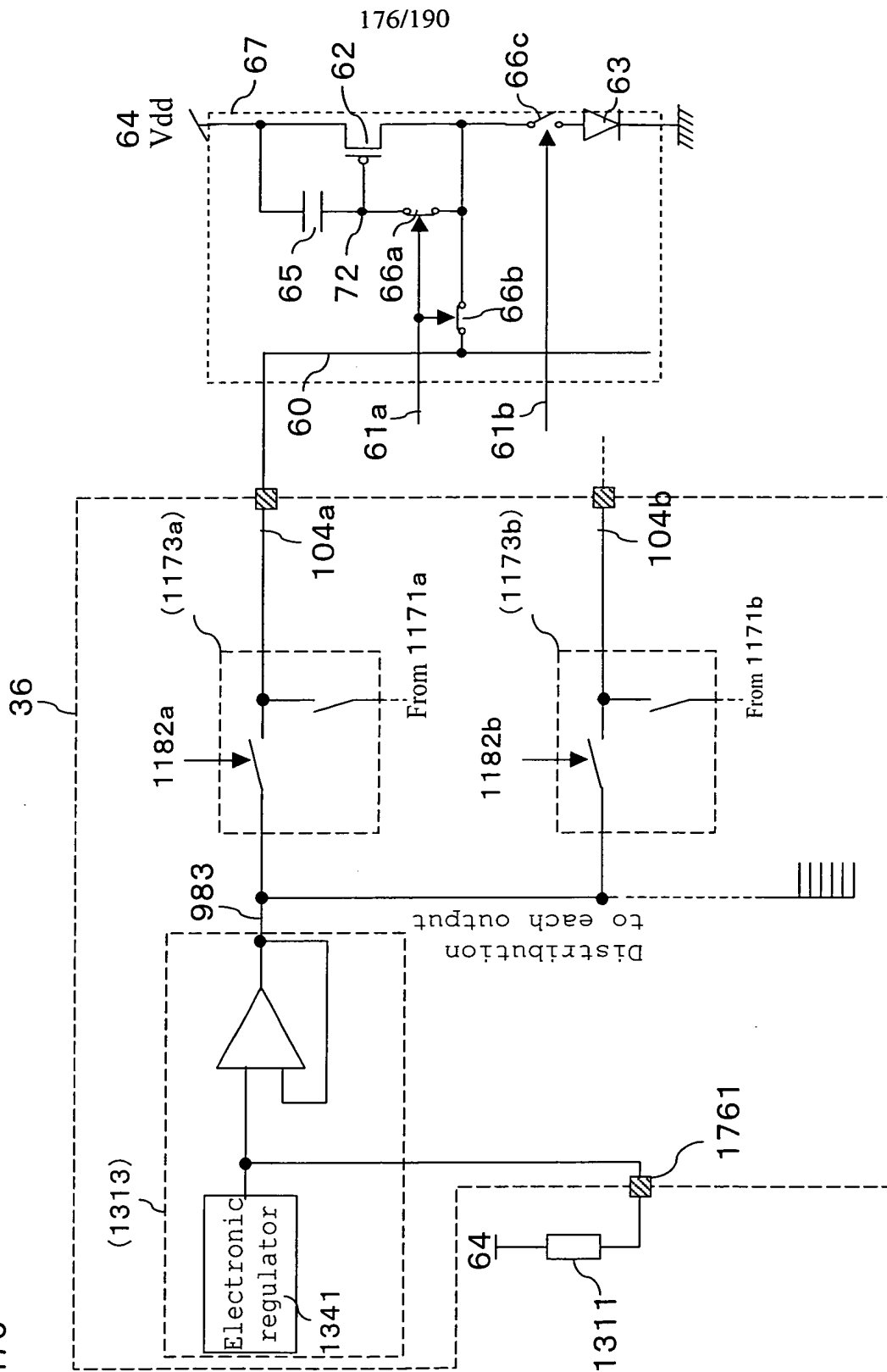
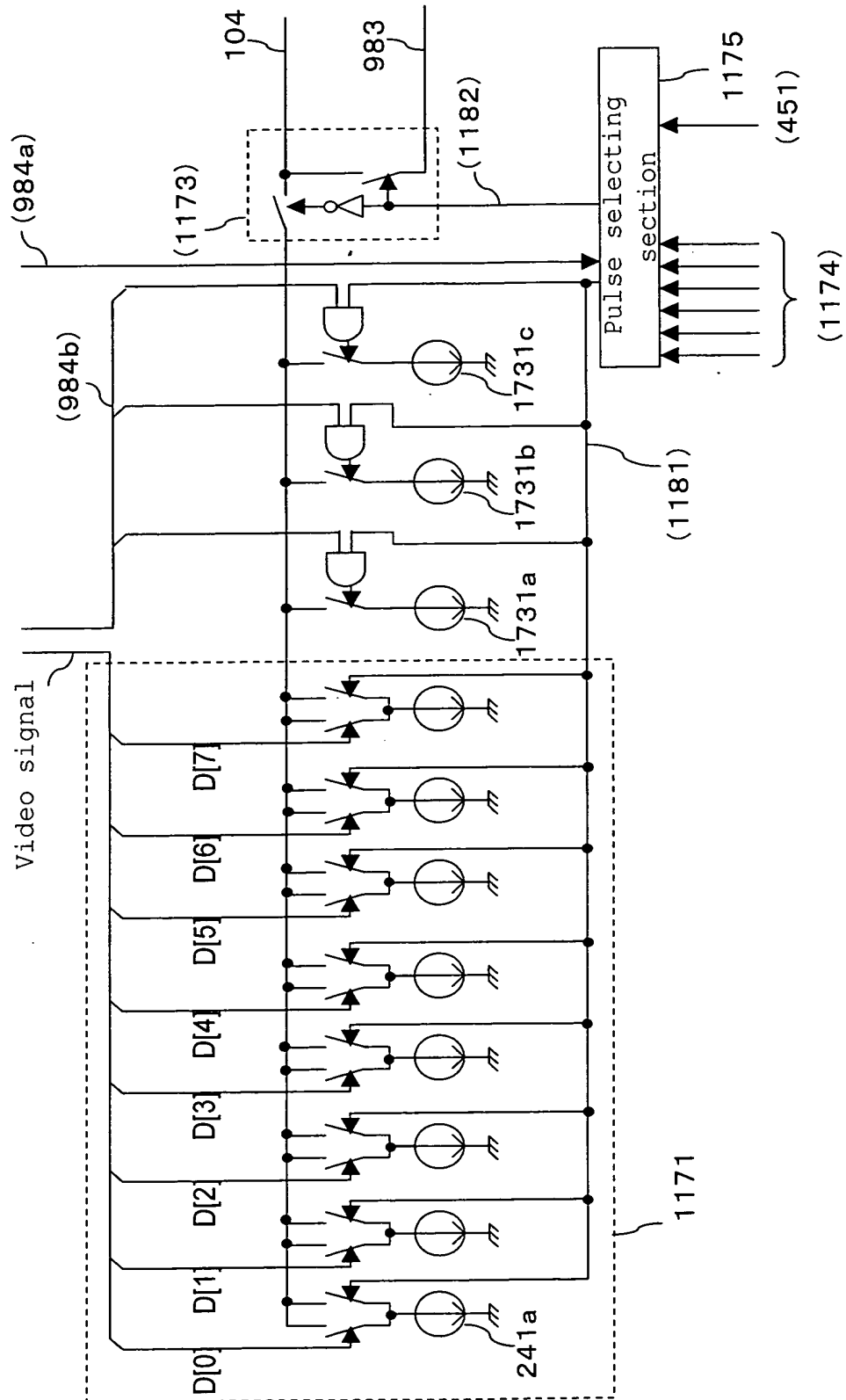


Fig. 176



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Fig. 177



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Fig. 178

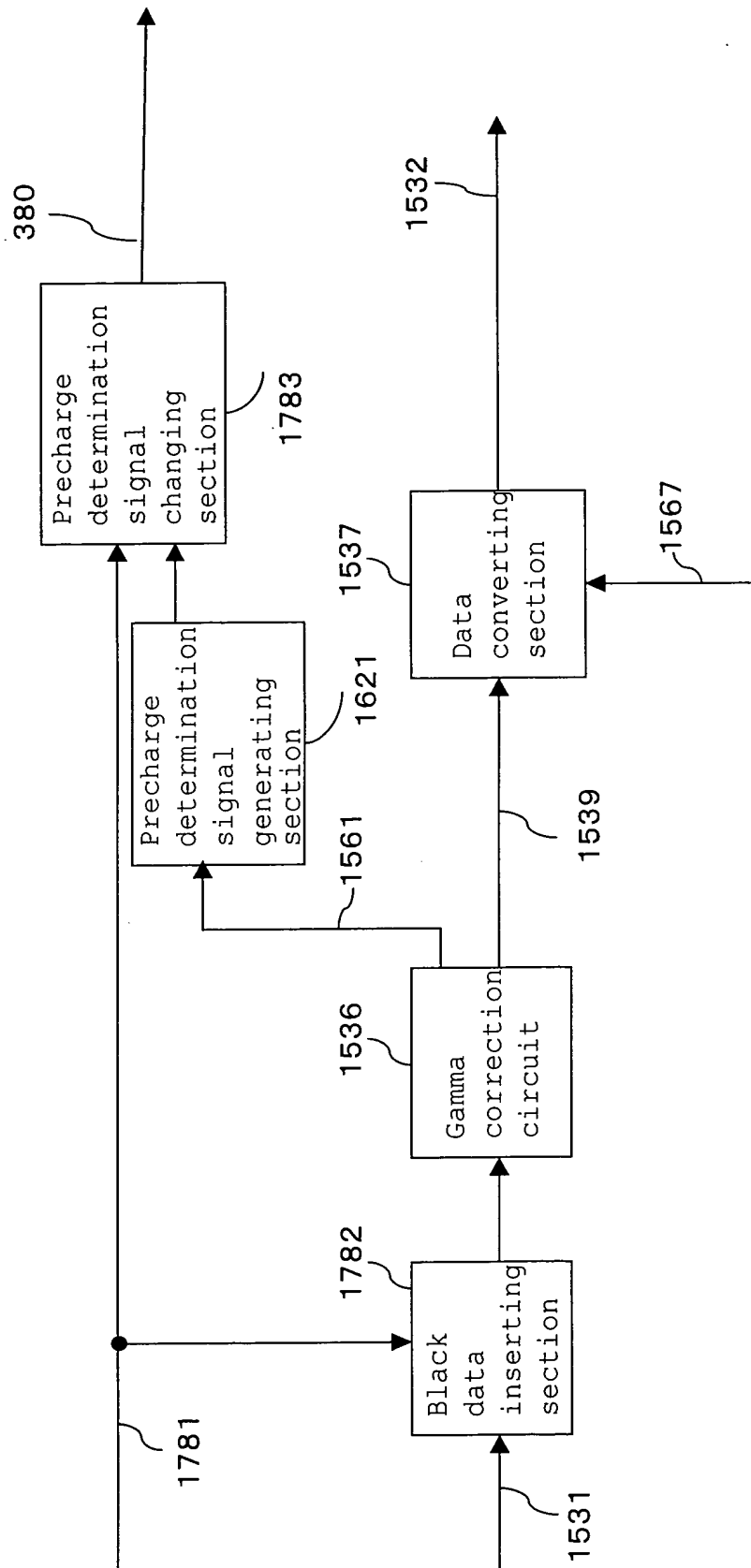


Fig. 179

State of data enable signal	Output from black data inserting section (1782)
Blanking period	Output gray level 0
Display data	Output same signal as input video signal

Fig. 180

State of data enable signal	Output from precharge determination signal changing section
Blanking period	Output "7" regardless of determination for input video signal (signal output required to carry out only voltage precharge)
Display data	Output determination for input video signal

Fig. 181 (a)

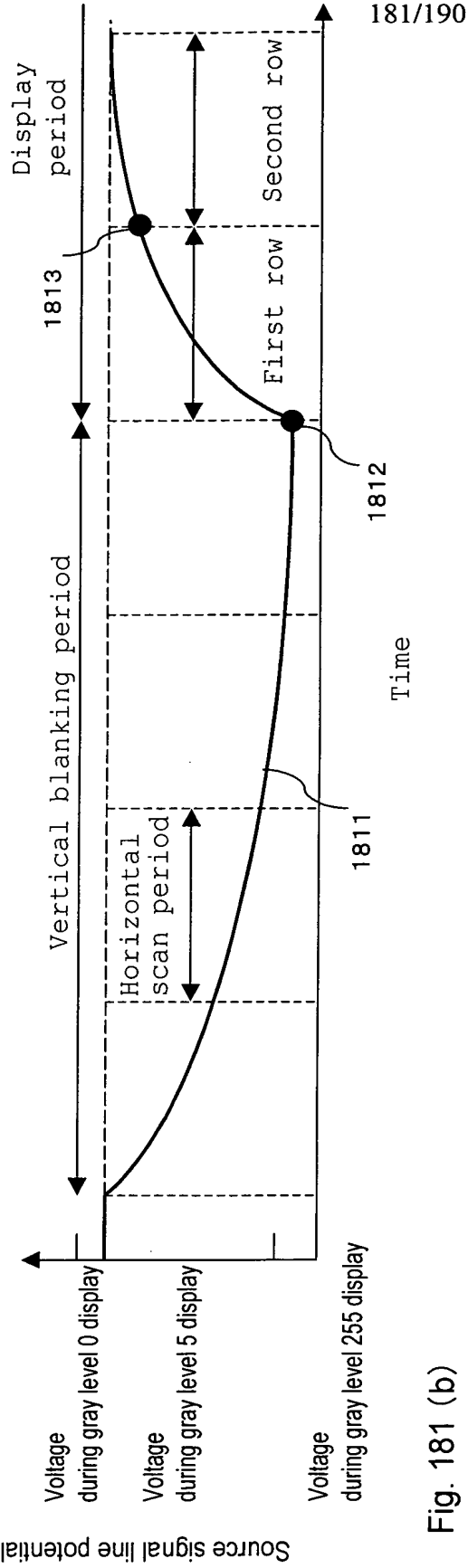
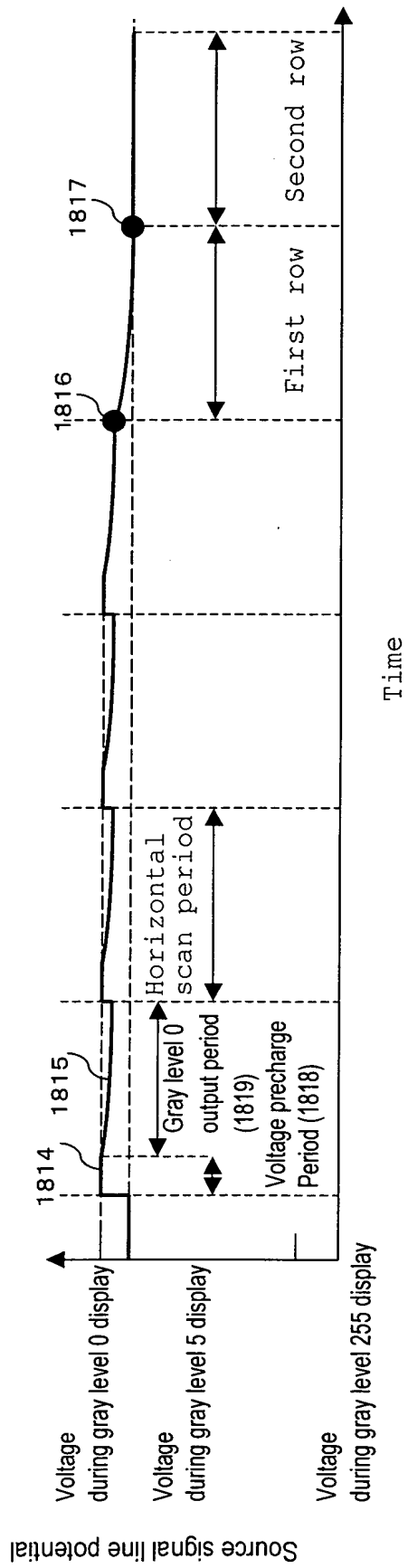


Fig. 181 (b)



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Fig. 182

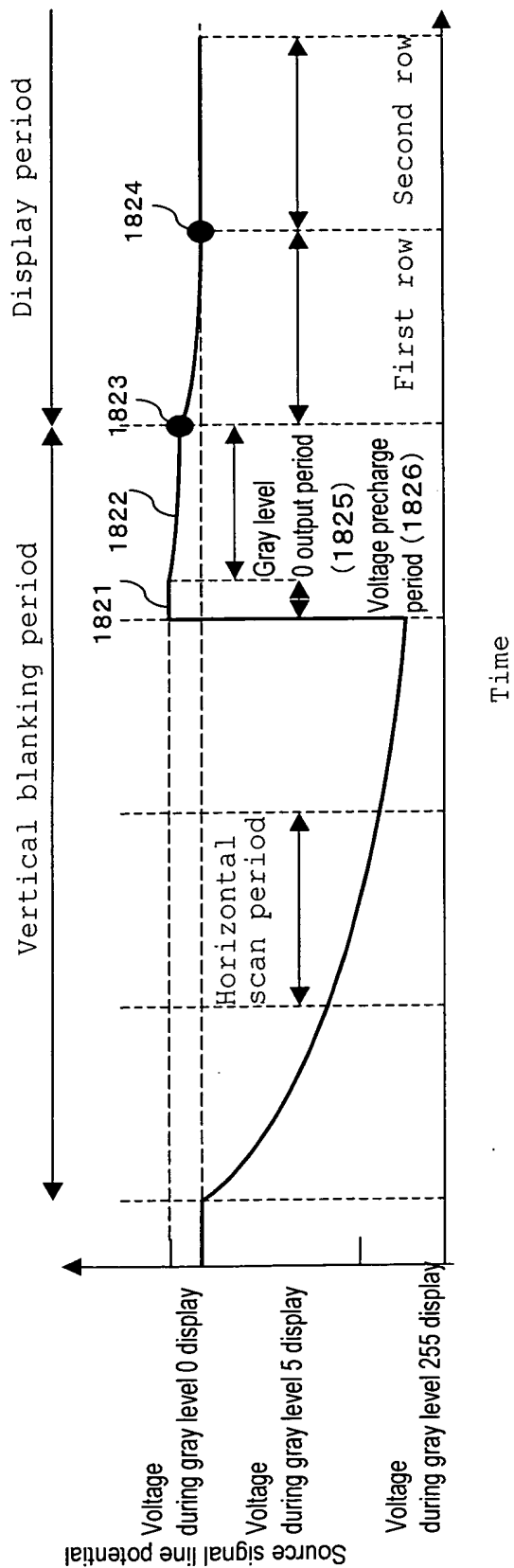
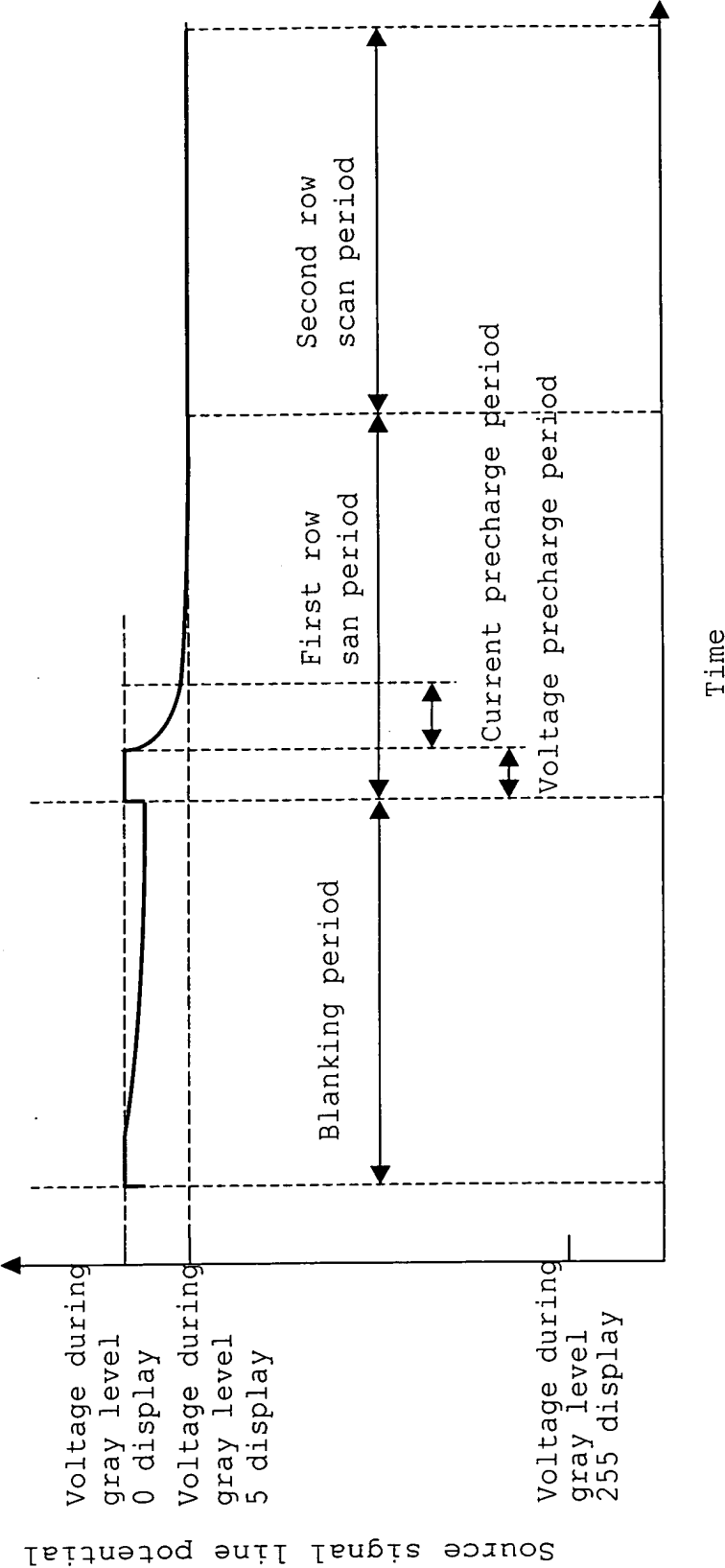


Fig. 183



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Fig. 184

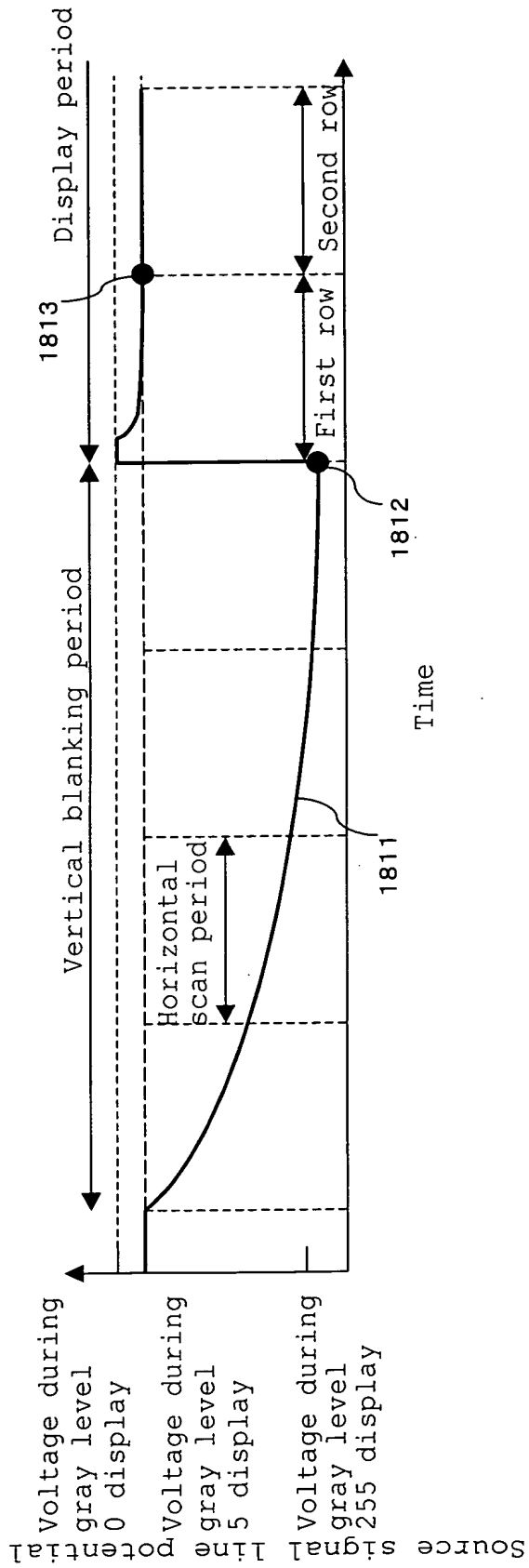


Fig. 185

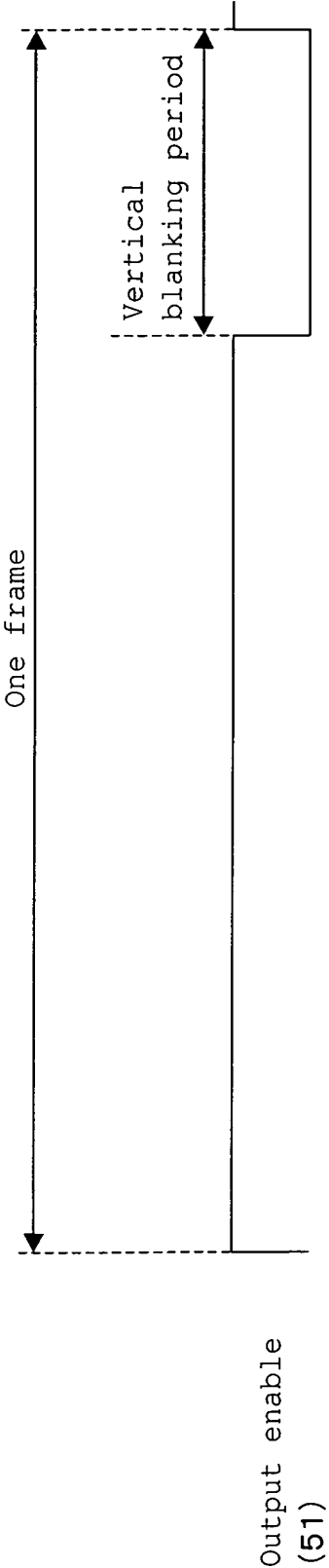
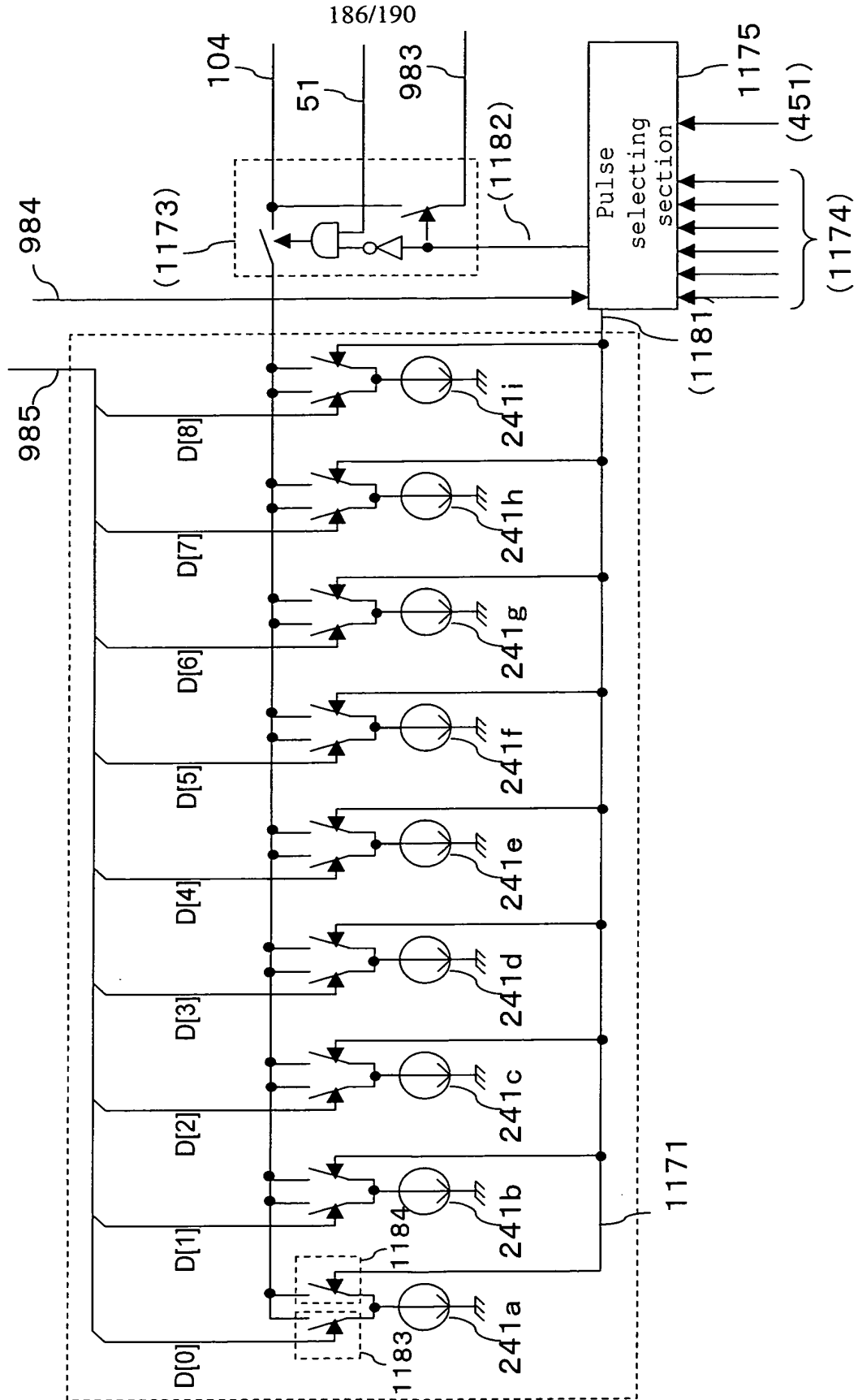


Fig. 186



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Fig. 187 (a)

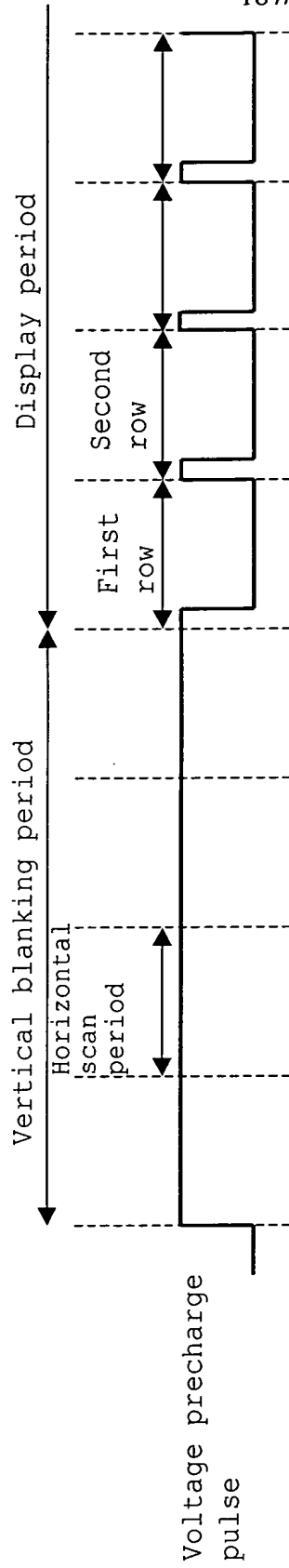
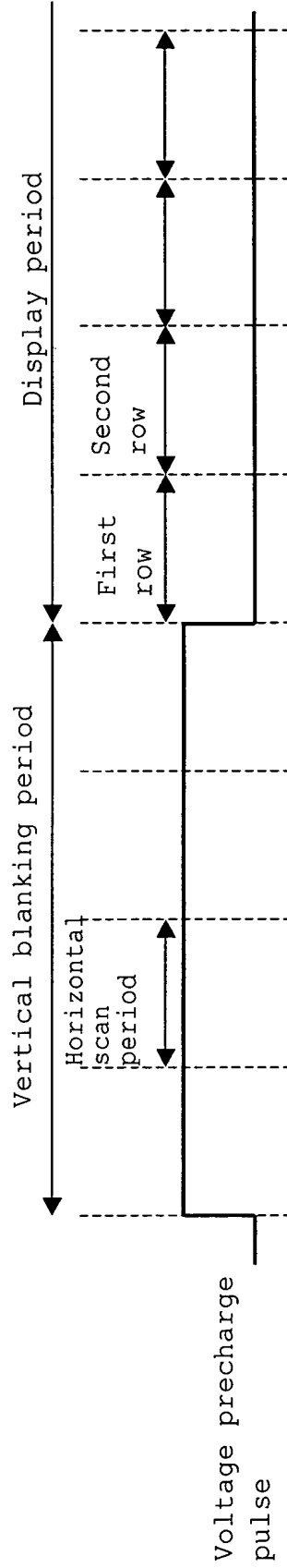
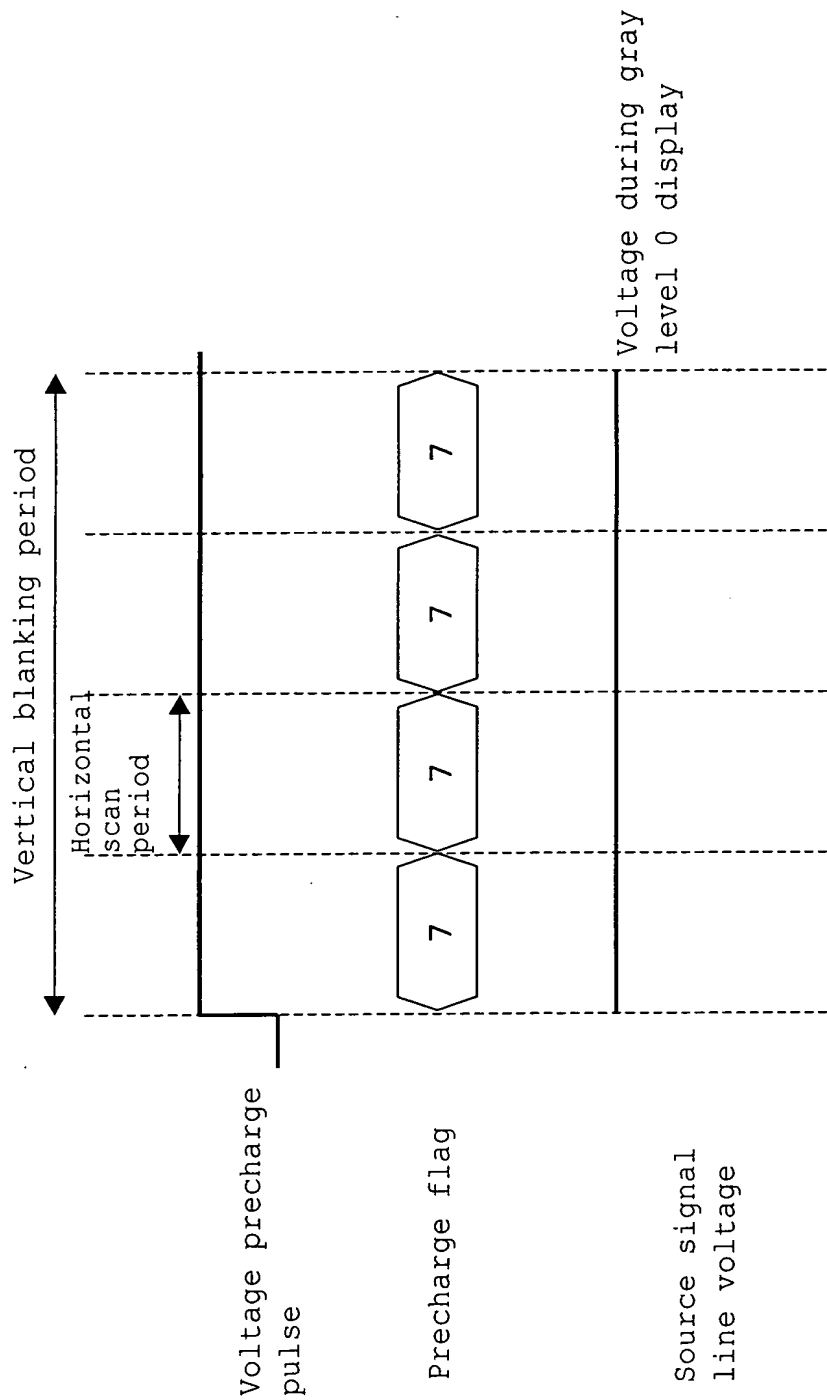


Fig. 187 (b)



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Fig. 188



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Fig. 189

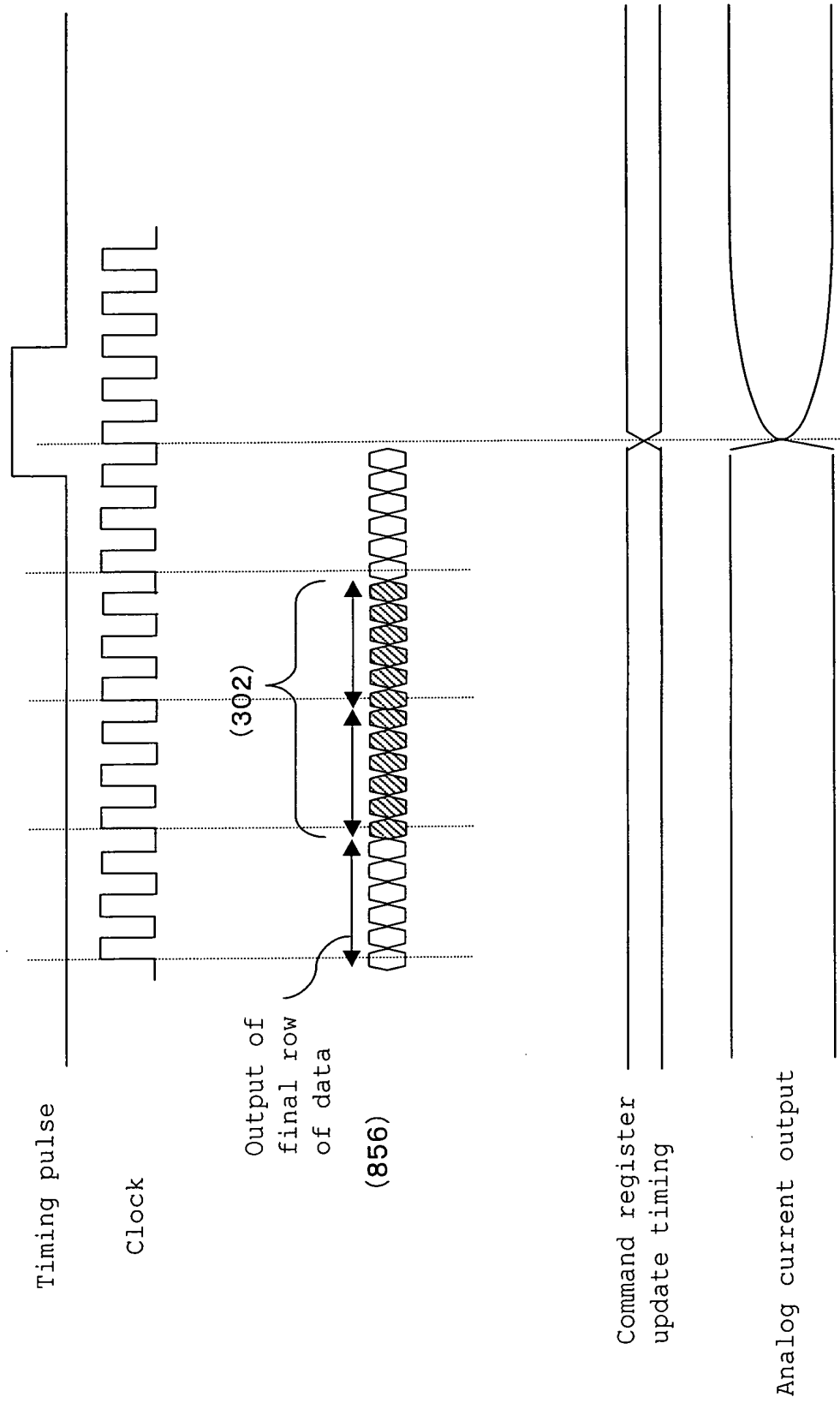


Fig. 190

